

8436-EM-O  
DTIC

5th International Conference  
on the  
Biogeochemistry of Trace Elements



July 11 - 15, 1969  
Vienna, Austria

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International Union of Soil Science

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The front page is showing *Thlaspi goesingense*, a Ni hyperaccumulator growing endemically on few serpentine outcrops in Eastern Austria.

## Introduction

This is the program of the 5<sup>th</sup> International Conference on the Biogeochemistry of Trace Elements held at the Technical University Vienna, July 11-15, 1999.

This conference is organized in continuation of a highly successful conference series that was started in 1990 in Orlando/Florida, with follow-ups in Taipei/Taiwan (1993), Paris/France (1995), and Berkeley/California (1997). At the time the program went to press we expected 450 to 500 participants from 50 countries. This represents clearly an increase in attendance, making this conference series a principal one among international meetings on the biogeochemistry of trace elements.

The conference is dedicated to explore and discuss contemporary and emerging issues in biogeochemistry research of trace elements. It provides a forum for professionals, regulators, and students to present their most recent findings and to discuss with colleagues from around the world the state-of-the-art in methodology, analytical techniques, and process development.

Conference topics cover important aspects of fundamental research such as kinetics and mechanisms of the fate of trace elements, including radionuclides, in soils and related ecosystems and methods for their assessment.

Based on the numerous contributions on the bioavailability of trace elements, this topic was chosen as a general conference theme. The keynote lectures, delivered by L. Kochian and I. Thornton, are addressing complementary aspects, i.e. plant-soil interactions focussing on the rhizosphere, and the foodchain.

The 5<sup>th</sup> ICOBTE '99 includes ten special symposia, coordinated by M. Mench, emphasizing key areas in trace element research, organized by experts in the respective topics.

In addition, nineteen technical sessions were arranged from the volunteered contributions by the editors of the extended abstract book.

The review process was coordinated by the editors. Manuscripts in the proceedings were peer reviewed by the members of the various committees of ICOBTE '99 and symposia organizers. The organizers wish to acknowledge with thanks, the peer reviews provided by these colleagues. We also wish to express our thanks to those who were involved in technical aspects of the review process and in editing the proceedings: A. Schnepf, N. Kirchbaumer, D. Schnepf, M. Schweiger and S. Strasser.

The conference was supported by the University of Agricultural Sciences Vienna and the International Union of Soil Science. Main sponsorship was provided by The City of Vienna, including the Office of the Mayor and Governor and the Department MA 18 (Group Science), the Austrian Federal Ministry of Science and Transport, and the American Society of Soil Science. Additional sponsoring came from The Vienna Convention Bureau, the European Research Board Office of the U.S. Department of Defense and the U.S. Department of Energy through the Savannah River Ecology Laboratory, the National Taiwan University, Die Burgenländische Anlage & Kreditbank AG., and Fürst Esterházy'sche Privatstiftung Lockenhaus.

## Conference Venue

The conference is held at the **Technical University of Vienna**, located in downtown Vienna.

The address of the convention place is: Technische Universität Wien

Freihaus

Wiedner Hauptstraße 8-10

A-1040 Vienna

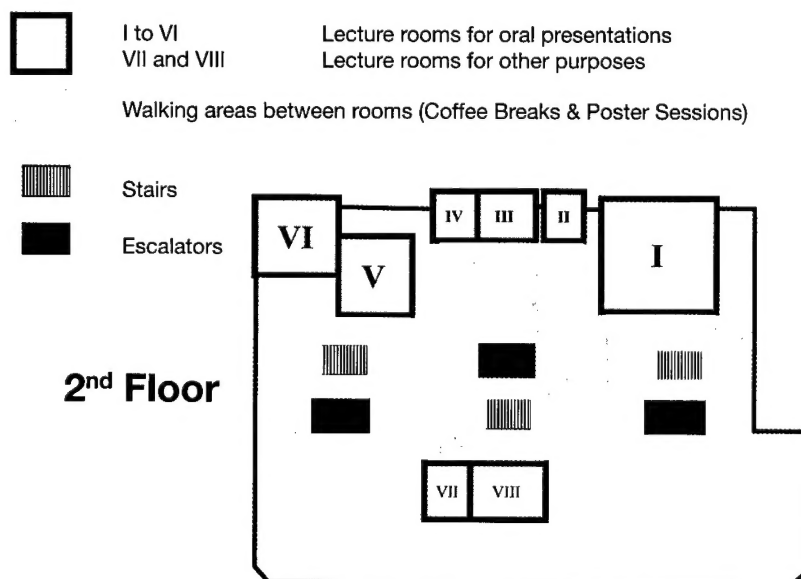
The conference activities are centered on three levels: ground level, 1<sup>st</sup> and 2<sup>nd</sup> floor (see maps). All lecture rooms are located on the 2<sup>nd</sup> floor, with room numbers I to VI. The opening

and closing ceremonies and the keynote lectures will take place in room I. Other oral sessions, including special symposia and technical sessions will be held in parallel in the rooms I to VI. Coffee/tea breaks and poster sessions will take place in designated areas located on all three levels.

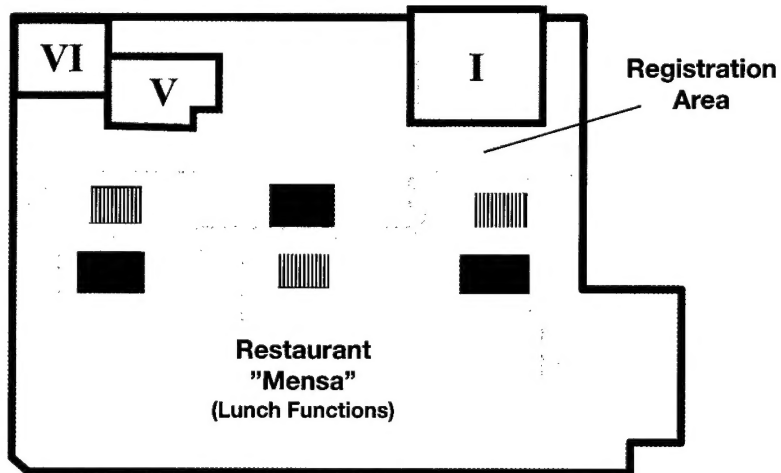
Lunch will be served in the restaurant which is part of the same facility. Lunch tickets are included in your conference package according to the number of days of registration.



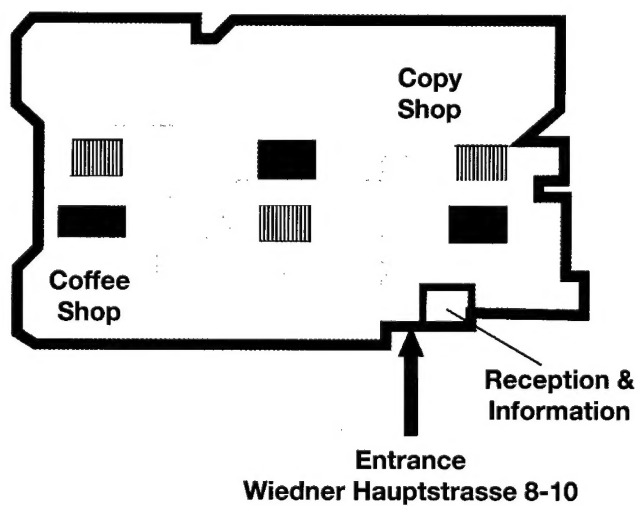
**Maps of the Convention Venue**



**1<sup>st</sup> Floor**



**Ground Level**



## Social Evening Functions

Upon invitation by the Mayor of Vienna, Dr. Michael Häupl, an evening reception (mixer) is scheduled on Sunday, July 11, 8:00 p.m., in the restaurant „Rathauskeller“ located in the basement of the historic Town Hall of Vienna. Alcoholic and non-alcoholic drinks are served along with various local snacks. A ticket for the reception is included in your conference package and should be presented at the entrance.

On Wednesday evening, July 14, a dinner at a Viennese wine pub (so called „Heurigen“) consisting of buffet style local Viennese food and young wine will be provided. In addition, non-alcoholic drinks and beer will be available. Special bus transfer to the wine pub is included in the registration fee. Busses will pick up participants in front of the convention place and will leave at 6:30 p.m. Participants who wish to arrange transfer individually will find the place at: Buschenschank Wolff, Rathstrasse 44-46, Neustift am Walde, A-1190 Vienna (Phone: 440 23 35). Bus transfer back to the five conference hotels will be available between 11:30 and 12:00 p.m.

## Tourist Attractions in / around Vienna

Detailed tourist information will be provided on site by PEGASUS INCOMING and is available at the webpage of the Vienna tourist board: <http://info.wien.at/>

## Presentations

Both oral and poster presentations are covering the most recent findings in trace element research and related issues.

**Oral presentations** in Technical Sessions are scheduled to last 15 minutes including discussion, while 30 minutes have been allotted to speakers in Special Symposia. The lecture rooms are equipped with overhead and slide projectors.

**Poster presentations** have been scheduled after the lunch break (see conference time schedule). Poster boards have a size of 186 (height) x 94 (width) cm (6.1 x 3.08 ft). Poster sessions are linked to Technical Sessions or Special Symposia. Posters should be mounted the whole day for which the session is scheduled. Authors are requested to be available during the session as indicated in the time table.

## Publication of Proceedings

All accepted papers (2 pages extended abstracts) have been included in the conference proceedings. These will be made available to participants during the conference.

In addition, some organizers of special symposia will publish selected full papers out of their symposia program.

## Scientific Program

Two keynote lectures delivered by leading scientists are covering current topics related to the main theme of the conference.

Special symposia are addressing key issues in trace element research and its application to environmental problems and land use. Leading scientists in their respective fields have been organizing ten symposia as listed below. Speakers in special symposia are allotted 30 minutes including discussion. Some symposia include poster presentations complementary to the topics addressed in the oral sessions.

The nineteen technical sessions include volunteered papers grouped according to their topics. Most sessions are divided in an oral and a poster section. Speakers in technical sessions are allotted 15 minutes including discussion.

Overviews on special symposia and technical sessions are listed below along with the session numbers (S1 to S10 for special symposia; T1 to T19 for technical sessions) and the designated lecture rooms ( I to VI).

## Keynote Lectures (July 12, 10:45 – 12:45, Room I)

Kochian Leon	The role of rhizosphere processes in the bioavailability of trace elements to plants
Thornton Iain	Bioavailability of trace elements in the foodchain

## Overview on Special Symposia

#	Symposium Title	Organizers	Room
S1	Phytoremediation	A.J.M. Baker, D. Salt, J. Vangronsveld	I
S2	Fate of Radionuclides	F. Carini, P. Coughtrey, C. Bunnenberg, M. Gerzabek	III
S3	Trace Elements and Pedology	D. Baize, J.-C. Vedy	V
S4	Bioavailability, Fluxes and Transfer of Trace Elements in Soils and Soil Components	M.B. Kirkham, I.K. Iskandar, A. Banin	V
S5	Fate of Trace Elements in the Rhizosphere	G. Gobran, E. Lombi, W.W. Wenzel	V
S6	Remediation of Metal-Contaminated Soils	R. Naidu, N.W. Lepp, N. van der Lelie	VI
S7	Trace Element Issues in Developing Countries	Z.-S. Chen, D. Chakraborti	III
S8	Trace Elements in Biosolids and Wastes Applied to Land	S.P. McGrath, P. Sequi, F. Zhao	I
S9	Kinetics and Mechanisms of Trace Element Sorption/Release on Natural Materials	M. Selim, D.L. Sparks	VI
S10	Metal-Organic Interactions	R.S. Sletten, N. Senesi	I

## Overview on Technical Sessions

#	Session Title	Room
T1	Analytical Tools	III
T2	Trace Elements in Agricultural Ecosystems	V
T3	Trace Element Interactions with Humans & Animals (posters only)	
T4	Trace Elements in Aquatic Ecosystems & Sediments	I
T5	Bioavailability of Trace Elements	IV
T6	Biogeochemistry, distribution & fractionation of Trace Elements	IV
T7	Trace Elements in Forest Ecosystems	II
T8	Trace Elements in Industrial & Municipal Residues	IV
T9	Microbial & Enzymatic Interactions	VI
T10	Mobility & Transport of Trace Elements	II
T11	Modelling & Prediction of the Fate of Trace Elements	V
T12	Biomonitoring & Risk Assessment	II
T13	Phytoremediation & Metal Accumulation in Plants	IV
T14	Polluted / Contaminated Environments	II
T15	Remediation & Restoration of Polluted Environments	II
T16	Retention & Adsorption of Trace Elements	
T17	Long-term Trends of Trace Element Deposition and Accumulation	IV
T18	Speciation	III
T19	Toxicity	II

## Reception



## Special Symposia

### S1 - Phytoremediation Oral Presentations (Room I)

#	Title	Authors
<b>Part 1 Chair: Alan Baker July 12, 16:00–18:15</b>		
	Introduction (16:00-16:15)	A. Baker
792	The genus <i>Thlaspi</i> as a source of plants for phytoremediation studies	Reeves R.C. Baker A.J.M. Thomas D.L.
825	Phytoextraction of metals from contaminated soils	Morel J.L. Schwartz C. Perronnet K. Saison C.
916	Critical Factors for the Application of Phytoremediation in Metal Contaminated Soils	Blaylock M. Elles M. Orser C.
897	Constraints to the growth and metal uptake by hyperaccumulator plants	McGrath S.P. Zhao F. Dunham S.J.
<b>Part 2 Chair: David Salt July 13, 08:15–10:15</b>		
31	Phytoremediation: Field trials in the years 1993-1998	Felix H.R. Kayser A. Schulin R.
226	Ecological consequences of metal accumulation and hyperaccumulation by plants.	Pollard A.J. Harrison K.R.
1110	Phytoextraction of soil Ni using <i>Alyssum</i> species	Chaney R. L. Angle S. J. Li Y.-M. Baker A. J.M. Reeves R. D. Roseberg R. J. Volk R. J. Nelkin J. P.
300	Benefits, limits and evaluation of long-term efficacy of phytostabilization and in situ inactivation of metal contaminated soils	Vangronsveld J. van der Lelie D. Ruttens A. Spelmans N. Clijsters H.
<b>Part 3 Chair: Jaco Vangronsveld July 13, 10:45–12:45</b>		
430	Accumulation and tolerance of nickel and zinc in <i>Thlaspi caerulescens</i> from serpentine, calamine, and normal soil	Schat H. Lugany M. Bernhard R. Assuncao A.
883	Zn accumulation by <i>Cardaminopsis halleri</i> as a function of initial metal localisation in different substrates	Dahmani-Muller H. Denaix L. van Oort F.
1135	Comparative analysis of metal uptake, transport and sequestration in hyperaccumulator plants	Smith J.A.C. Harper F.A. Leighton R.S. Thompson I.P. Vaughan D.J. Baker A.J.M.
477	Phytovolatilization and the Phytoremediation of Selenium	Terry N. Zayed A. Pilon-Smits E. de Souza M.
<b>Part 4 Chair: Andrew Smith July 13, 16:00–18:00</b>		
797	Progress towards a molecular understanding of metal hyperaccumulation in plants	Salt D.E.
982	A molecular physiological analysis of heavy metal transport in a hyperaccumulating plant species	Kochian L.
915	Copper responses in the model plant <i>Arabidopsis thaliana</i>	Murphy A. Taiz L.
1058	Ecotoxic mercury reduction by transgenic plants	Rugh C.L. Wang J.N.-J. Bizily S.P. Heaton A.C.P. Dhankher O.P. Meagher R.B.

## S2 - Fate of Radionuclides Oral Presentations (Room III)

#	Title	Authors
<b>Part 1 Chair: Franca Carini July 12, 14:00-15:30</b>		
967	Radioecology and Soil Science	Desmet G.
1076	The UIR action on environmental models and data	Coughtrey P.
448	The role of soil fauna in radionuclide transport in soils	Bunnenberg C.
<b>Part 2 Chair: Franca Carini July 12, 16:15-18:15</b>		
37	The role of microbial activities in the exchanges of radionuclides between the sediments and the water column	Remacle J. Hambuckers F.
835	The role of microbiota in the behaviour of radionuclides in semi-natural ecosystems	Kostyuk O. Bunnenberg C.
22	Possible effects of root action in the rhizosphere on the adsorption of trace amounts of nickel by various soils	Staunton S. Bonafos B. Leclerc-Cessac E.
319	A CaCl <sub>2</sub> 0.01 M soil extract predicts the soil solution composition and plant availability of Cs-137	Waegeneers N. Smolders E. Merckx R.
<b>Part 3 Chair: Peter Coughtrey July 13, 08:15-10:15</b>		
616	Mobility of Cs-137 and Sr-90 related to speciation studies in contaminated soils of the Chernobyl area	Gri N. Stamrose D. Guillou P. Genet M.
84	Fluxes of Cs-137, Co-60 and Ra-226 in the soil – water – plant system as determined by lysimeter experiments	Gerzabek M. Strebl F. Temmel B.
318	Radiocaesium and potassium dynamics in a willow short rotation coppice stand	Gommers A. Thiry Y. Vandenhove H. Vandecasteele C.M. Smolders E. Merckx R.
470	Modeling the soil-to-plant concentration ratio for the radionuclide Ni-63	Denys S. Echevarria G. Leclerc-Cessac E. Morel J.L.
<b>Part 4 Chair: Martin Gerzabek July 13, 10:45-12:45</b>		
872	Energy crops for remediation of contaminated land	Vandenhove H. Thiry Y. Gommers A. Goor F. Jossart J.M. Holm E. Gäufert T. Roed J. Grebenkov A. Timofeyev S.
18	Alternative agriculture and fate of Cs-137 and Sr-90 in the Chernobyl exclusion zone	Dushenkov S. Sorochinsky B.
98	Fate of Tc-99 in a soil-plant-animal system	Echevarria G. Feidt C. Berthol D. Morel J.L. Brun-Bellut J.
871	Inventory and horizontal variability of Caesium-137 in rainforest soil of Costa Rica	Bossew P. Strebl F.
<b>Part 5 Chair: Claus Bunnenberg July 13, 16:00-18:15</b>		
977	Fate of radiocaesium in forests and forest soils: A review	Delvaux B. Maes E. Thiry Y. Kruyts N.
86	Radiocaesium distribution in different components of an Austrian forest stand	Strebl F. Bossew P. Gerzabek M. Kienzl K.
1068	The influence of climate on radionuclide behaviour in the terrestrial environment	Carini F.
1129	Cs-137 Flux from soil to roe deer	Zibold G. Drissner J. Kamert S. Klemt E. Miller R.

### Poster Presentations

#	Title	Authors
<b>July 13, 14:00-15:30</b>		
678	Long-term dynamics of Chernobyl-derived Sr-90 in soil solutions of forest ecosystems	Agapkina, G.I.
958	Radiocesium output from the catchment of river Traun (Austria) by surface water	Bossew P. Lettner H. Hubner A. Haunschmid B. Strebl F. Kienzl K.
89	Behavior of radionuclide Cs-137 in a wet montane forest ecosystem in subtropical Taiwan.	Chiu C.-Y. Hseuh W.W.-Y. Lai S.-Y. Chen C.-J. Lin Y.M.
710	Mobility of cesium and strontium in water soil erosion	Claval D. Real J. Rouxel R.
948	Plant uptake of radiocesium and radiostrontium	Herren T. Riesen T.
929	Mathematical model of Cs-137 dynamics in the coniferous forest	Mamikhin S.
1067	Modification of radiocesium transfer from soil to plants	Mikheev A. Kutlakhmedov Y.
1005	Uptake of radiocesium by root and distribution between roots and shoots	Pinel F. Leclerc-Cessac E. Staunton S.
971	Root uptake of Cs-137, stable Cs and K from paddy soils in rice plants	Tsukada H. Hasegawa H. Hisamatsu S.
112	Speciation of Radium in uranium mill tailing study of chemical extractions.	Yousfi I. Geiss O.
1021	Influence of pH and monovalent ions on cesium uptake of <i>H. Crustuliniforme</i> and <i>P. Fortinii</i> in batch cultures	Zichner A. Riesen T.

### S3 - Trace Elements & Pedology Oral Presentations (Room V)

#	Title	Authors
<b>Part 1 Chair: Denis Baize July 15, 08:00-10:15</b>		
	Introduction (8:00-08:15)	D. Baize
187	Small-scale chemical heterogeneity in soils: distribution of metals in aggregates	Wilcke W.
843	Stocks and fluxes of trace metal elements in natural forest ecosystem on volcanic ash	Semlali M.R. Denaix L. van Oort F. Latrille Ch.
696	Pedology and heavy metals - a regional application in Italy	Bini C. Giandon P. Vinci I.
688	Total contents of trace elements in soils. Determination of the pedo-geochemical background. Usefulness, sampling strategy and data processing	Baize D.
<b>Part 2 Chair: Denis Baize July 15, 10:45-11:15</b>		
162	Complex soil evolution and trace metals: the case of Hg in the atlantic ranker	Martinez Cortizas A. Looijaard A. Garcia-Rodeja E.

### Poster Presentations

#	Title	Authors
<b>July 15, 14:00-15:30</b>		
194	Spatial variability of Hg and water-soluble Hg species content in the forest litter of Podzolic soils caused by natural factors	Gladkova N.S. Malinina M.S.

744	Profile distribution of trace elements in forest soils developed from granite and gneiss	Kabala C. Szerszen L.
815	The distribution of trace elements in soil profile of different major soil groups of Taiwan	Tsai C.-C. Chen Z.-S.

## S4 - Bioavailability, Fluxes & Transfer of Trace Elements in Soils & Soil Components

### Oral Presentations (Room V)

#	Title	Authors
<b>Part 1 Chair: Marybeth Kirkham July 12, 16:00-18:15</b>		
	Introduction (16:00-16:15)	M. Kirkham
1053	Bioavailability and fate of trace elements in long-term, residual-amended soil studies	Vance G.F. Pierzynski G.M.
457	Mobility and bioavailability of trace elements in the soils of the Czech Republic	Podlesakova E. Nemecek J. Vacha R.
768	Sequential extraction of metals from artificially contaminated soils in the presence of composts from various sources	Madrid L. Diaz-Barrientos E. Cardo I.
179	Induced hyperaccumulation - metal movement and problems.	Anderson C. Deram A. Petit D. Brooks R. Stewart B. Simcock R.
<b>Part 2 Chair: Alex Iskandar July 13, 08:15-10:15</b>		
828	Bioavailability and flux of copper in EDTA-treated soil	Clothier B.E. Vogeler I. Green S.R. van den Dijssel C. Robinson B.H. Kirkham M.B.
983	Heavy metal fluxes in perturbed soils at various moisture regimes	Banin A. Han F.X.
1130	Factors affecting the migration of lead and copper from military small arms firing ranges	Bricka R.M.
306	Effect of organic matter, temperatures and reaction time on partitioning of the solid phase species of Cd-109 and Zn-65 in an alum shale soil	Almaas A. Singh B.R. Salbu B.
<b>Part 3 Chair: Amos Banin July 13, 10:45-12:45</b>		
308	Solid phase speciation of Cd, Ni and Zn in some contaminated and non-contaminated tropical soils	Kashem A. Singh B.R.
834	Quality of estimated Freundlich parameters of Cd sorption from pedotransfer functions	Springob G. Böttcher J.
736	Transport of trace metals: linking the role of colloids, redox conditions and hydrology	Gruau G. Riou C. Lauquet G. Dia A. Jaffrezic A. Molenat J.
387	Effect of dissolved organic carbon (DOC) on desorption kinetics of Molybdenum from iron oxides.	Lang F. Kaupenjohann M.
<b>Part 4 Chair: Alex Iskandar July 13, 16:00-18:00</b>		
346	Regularities of Copper (II) retention by Chernozem, Dermovo-Podzolic and Grey Forest soils.	Ponizovsky A. Studenikina T.A. Mironenko E.V.
147	Bioavailability of Cu, Zn and Mn in contaminated soils and speciation in soil solution	Rimmer D.L. Menzies N.W. Reichman S.
454	Quantification of bioavailability of heavy metals for plants and oligochaete worms	Baerselman R. Peijnenburg W. Jager D.T. Posthuma L. Van Veen R.P.M.
468	Phytoavailability of cadmium in soils as assessed by isotopic methods.	Gerard E. Echevarria G. Sterckeman T. Morel J.L.

## S5 - Fate of Trace Elements in the Rhizosphere

### Oral Presentations (Room V)

#	Title	Authors
<b>Part 1 Chair: George Gobran July 14, 08:00-10:15</b>		
	Introduction (8:00-8:15)	G. Gobran
5	Solid phase speciation of metals in the rhizosphere of forest and urban soils	Courchesne F. Séguin V. Dufresne A.
103	Bioavailability of trace elements as related to root-induced chemical changes in the rhizosphere	Hinsinger P.
720	Can Rhizosphere chemical changes enhance heavy metal absorption by plants growing in calcareous soil ?	Fenn L.B. Assadian N.
860	Heavy Metals at the soil-root interface: interaction of Cu(II), Pb(II), Zn(II) and Cd(II) with a Ca-PGA network	Deiana S. Gessa C. Manunza B. Lauro G.P. Palma A.
<b>Part 2 Chair: Enzo Lombi July 14, 10:45-12:45</b>		
636	A physiological and genetic investigation of the role of root exudates in aluminium tolerance	Kochian L. Garvin D.
693	Metal speciation in symbiotic fungi (ectomycorrhizae) using micro X-ray spectroscopy	Berthelsen B.O. Lamble G.M. Nicholson D.G.
936	Rhizospheric mobilisation of radiocesium in forest soils differing in weathering stage, clay mineralogy and organic matter content	Kruijts N. Sandri C. Delvaux B.
725	Cation exchange properties of roots: Experimental and modelling	Dufey J. Rufyikiri G. Genon J.G. Delvaux B.
<b>Part 3 Chair: Walter Wenzel July 14, 16:00-18:00</b>		
912	Model calculations of the distribution dynamics of aluminum in the rhizosphere of acid forest soils	Nietfeld H.
301	Heavy metal mobility in soil affected by siderophores and citric acid	Neubauer U. Furrer G. Schulin R.
764	The root/soil interface at conditions of metal toxicity and nutrient deficiency: a study emphasizing the role of root exudates	Luster J. Funk F. Heim A. Jung C. Ivano B. Sticher H. Frossard E.
1100	Removal of cadmium by hyphae of arbuscular mycorrhizal fungi	Leyval C. Joner E.

### Poster Presentations

#	Title	Authors
<b>July 14, 14:00-15:30</b>		
995	Occurrence of mycorrhizae and root nodules in plants growing on tannery effluent polluted soils	Khan A.G.
78	Metal uptake in ectomycorrhizal biomass in vitro	Berthelsen B.O. Olsen R.A. Steinnes E.
390	Intensification of nodulation and nitrogen fixing activity preceding the "loss of function" by the long-term application of some toxic metal rates	Biro B. Köves-Pechy K. Vörös I. Kadar I.
1177	Bahaviour of micronutrients in the rhizosphere	Chino M. Goto S. Youssef R. Miah Y. Long C.-D.
1154	Effect of irrigation using sewage water on the distribution	El-Motaium R.A. Badawy S.H.

	of some heavy metals in bulk and rhizosphere soils and different plant species: cabbage plants ( <i>Brassica oleracea</i> L.) and orange trees ( <i>Citrus sinensis</i> L.)	
829	Uptake of Zn and Cu by mycorrhiza <i>Leucaena leucocephala</i> from heavy metal polluted soil under greenhouse and field conditions of the Nahda region of Egypt	Helal H.M. Issa G.I.
1104	Rhizosphere-contaminant interaction and its role in phytoremediation	Lombi, E. Wenzel, W.W. Gobran, G.R. Adriano, D.C.
393	Variations of radiocaesium bioavailability in bulk and rhizosphere soils as influenced by willow plant growth.	Thiry Y. Gommers A. Delvaux B.
866	The effect of application of different nitrogen forms on the accumulation of Cd in plants	Ilustos P. Balik J. Szakova J. Pavlikova D. Hanc A.
515	Impact of nickel on the distribution of other heavy metals across the rhizosphere of wheat	Youssef R.A. Hayashi H. Chino M. Goto S.
1014	Survival and adaptation of rhizobial population inoculated into industrially contaminated soils	Castro I.V. Ferreira E. McGrath S.P.
739	Bioavailability of copper in the rhizosphere of rape and ryegrass cropped in vineyard soils	Cherrey A. Chaignon V. Hinsinger P.
1128	A technique for quantitative trace element and micronutrient studies of plants	Göransson S.
283	Oxidative stress - biochemical base for its copper-dependent occurrence in grain legume nodules	Seliga H.
1063	Micronutrients uptake in red beet ( <i>Beta vulgaris</i> L.) inoculated with plant growth promoting rhizobacteria of the <i>Pseudomonas</i> genus on various productive soils	Shabayev V.P. Safrina O.S. Smolin V.Yu.
1170	The uptake properties of potassium in the rhizosphere of different sugarbeet genotypes	Zhou J. Märländer B. Glattkovski H. Gui G.

## S6 - Remediation of Metal-Contaminated Soils

### Oral Presentations (Room VI)

#	Title	Authors
<b>Part 1</b> <b>Chair: Ravi Naidu</b> <b>July 14, 08:00-10:15</b>		
	Introduction (8:00-8:15)	R. Naidu
1137	Sampling, Assessment and risk analyses of metal contaminated soils	Davies B. Corell R.
1158	Ex situ remediation options and fundamental principles	Rulkens
1151	In situ remediation of contaminated soils - options and fundamental principles	Vangronsveld J. Ruttens A. Spelmans N. Clijsters H.
1138	Minimising the bioavailability of metal contaminants using naturally occurring minerals	Churchman J.
<b>Part 2</b> <b>Chair: Ravi Naidu</b> <b>July 14, 10:45-12:45</b>		
1139	Strategies for managing diffuse metal contamination of rural soils	McLaren R. McBride M.
1117	Utility, Human and Ecosystem impact, and remedial technologies for lead in the environment	Brown S.L. Chaney R.L.
1162	Assessing bioavailability using biological techniques and implications to remediation of metal contaminated soils	Jauzein M. Berthelin J.
1156	Deciding treatments for remediation of contaminated soils	Burmeier H.

<b>Part 3</b>		<b>Chair: Nick Lepp</b>	<b>July 14, 16:00-18:00</b>
1141	Remediation of metal (As, Cd, Cu, Pb and Zn) contaminated soils	Basta N. Piezynski G.M.	
970	Soil-based countermeasures for and redemaiton of soils contaminated with radionuclides	Zhu Y.-G. Adriano D.C. Willey N.J.	
1140	Use of heavy metal resistant bacteria in a bioreactor concept (bacteria metal sludge reactor) to remove bioavailable heavy metals from polluted soils.	van der Lelie D. Corbisier P. De Smet M. Hannes L. Kinnaer L. Mergeay M. Spelmans N. Vangronsveld J. Diels L.	
1143	Current remediation technologies in Australia, New Zealand and South Pacific	Hill B.D. Naidu R.	
<b>Part 4</b>		<b>Chair: Niels van der Lelie</b>	<b>July 15, 08:15-10:15</b>
1144	Current approach to managing and remediating metal contaminated soils in China	Wong M.H. Lan C.Y. Gao L. Chen H.M.	
1142	Current Remediation Technologies for Metal-Contaminated Soils in the United States	Pierzynski G.M.	
1146	Evaluation of heavy metal contaminated soils and remediation options at selected industrial sites in sweden	Bhattacharya P. Jacks G.	
1145	Bioremediation of metal contaminated soils – strategies for India and neighbouring countries	Paknikar K.M.	
<b>Part 5</b>		<b>Chair: Niels van der Lelie</b>	<b>July 15, 10:45-11:15</b>
1150	Rehabilitation of contaminated land: A regional European perspective	Lepp N.	

## S7 - Trace Element Issues in Developing Countries

### Oral Presentations (Room III)

#	Title	Authors
<b>Part 1</b>		<b>Chair: Zueng-Sang Chen</b>
		<b>July 14, 08:00-10:15</b>
	Introduction (8:00-8:15)	Z.-S. Chen
261	Contamination of Hungarian Soils by trace elements.	Bujtas K. Csatho P. Kadar I.
26	Environmental Issues of trace metals in Russia.	Pinskii D.L.
972	Arsenic in groundwater and sufferings of people in eight districts of West Bengal, India	Samanta G. Mandal B.K. Roy Chowdhury T. Biswas B.K. Chowdhury U.K. Basu G.K. Chanda C.R. Lodh D. Saha K.C. Chakraborti D.
745	Environmental and agricultural aspects of trace metals in soils of Poland	Kabata-Pendias A. Stuczynski T.I.
<b>Part 2</b>		<b>Chair: Dipankar Chakraborti</b>
		<b>July 14, 10:45-12:45</b>
750	Soil Contamination issues in the republic of Korea	Kim K.-H. Hyun H.-N. Yoo S.-H. Kim B.Y.
202	Soil contamination and trace element issues in Taiwan	Chen Z.-S.
816	Heavy metal pollution of soils and water and their transfer into plants in Bangladesh	Ullah S.M. Gerzabek M.H. Mondal N. Mahbub M. Islam M.
1016	Brazil: A national report on environmental issues on trace elements	Lucchesi L.A.C. Bittencourt A.V.L. Borkert C.M. Garcia O.Jr. Licht O.A.B. Prezzoto M.E. Reissman B. Secco R.

<b>Part 3</b>		<b>Chair: Dipankar Chakraborti</b>	<b>July 14, 16:00-16:30</b>
1052	Fluorosis in India: State of art report	Susheela A.K.	

## S8 - Trace Elements in Biosolids & Other Wastes

### Oral Presentations (Room I)

#	Title	Authors
<b>Part 1</b>		
<b>Chair: Steve McGrath</b>		
<b>July 14, 08:00-10:15</b>		
	Introduction (8:00-8:15)	McGrath
830	Sources of heavy metals to agricultural soils in England and Wales	Nicholson F.A. Chambers B.J. Unwin R.J.
879	Relationship between soil copper adsorption and DOM derived from sewage sludge and compost	Wong J.W.C. Zhou L.X.
254	Characterization of transition metal species in the solution of sandy soil amended with sewage sludge	Vulkan R. Mingelgrin U. Ben-Asher J.
292	Factors affecting the solubility of zinc, cadmium, copper and nickel in sewage sludge amended soils	Zhao F. McGrath S.P. Dunham S.J.
<b>Part 2</b>		
<b>Chair: Paolo Sequi</b>		
<b>July 14, 10:45-12:45</b>		
83	Bioavailability of cadmium and zinc 18 years post biosolids applications	Dowdy R.H. Sloan J.J. Dolan M.S.
237	The behaviour of heavy metals in sludge-amended soils: ecotoxicological risks evaluation at low sewage sludge application rates	Planquart P. Massiani C. Prone A. Bonin G.
781	Assessment of Risk from Biosolid-Mo	O'Connor G. McDowell L.R. Nguyen H.Q.
117	Relationship between biosolid metal concentration, metal fractionation and bioavailability	Rogers S.L. McLaughlin M.J.
<b>Part 3</b>		
<b>Chair: F. Zhao</b>		
<b>July 14, 16:00-18:00</b>		
563	Heavy metal leaching from sewage sludge treated soils	McLaren R.G. Taylor M.D. Hendry T.
445	Effect of Fe-Oxide on bioavailability of trace metals in biosolids	Rule J.H. Martin S.
268	Management of sewage sludge amended soils to alter heavy metal "bioavailability"	Speir T. Percival H. Van Schaik A.
1125	Applying biosolids to acid soils in NSW, Australia: Sustained availability of Cd 8 Years after application	Whatmuff, M.S.

### Poster Presentations

#	Title	Authors
<b>July 14, 14:00-15:30</b>		
960	Bioavailability of trace metals in crops as influenced by radiation processed sewage sludge	Ahmed S. Hossain M.B. Rahman S.M.
925	The distribution of heavy metals in plants growing in soils treated by sewage sludge	Balik J. Tlustos P. Szakova J. Hanc A. Blahnik R.
694	Metal ion activities in long-term biosolid-amended soil	Berton R.S. Chang A.C. Page A.L.
465	Trace metals content in soil after long term application of sewage sludge as a fertilizer	Bourgeois S. Michelin J. Wiat J.



279	Heavy metal in soil amended with municipal solid waste compost for ten years	Collier L.S. Velloso A.C.X. Amaral Sobrinho N.M.B.do
711	Trace elements variations in a Vertisol of southern Italy amended with municipal solid waste compost	Convertini G. Ferri D. La Cava P.
846	Speciation and movement of selected heavy metals in long-term poultry waste-amended soils	Han F.X. Kingery W.L. Selim H.M.
880	Remediation of mimicked cadmium contaminated soil using coal fly ash stabilized biosolids	Ho K.L. Wong J.W.C.
741	Impacts of heavy metal contaminated sewage-sludge on <i>Rhizobium leguminosarium</i> Biovar. <i>Trifolii</i>	Horswell J Speir T.
76	Impact of sewage sludge on heavy metal concentrations of agricultural soils in Luxembourg.	Hupperich M. Hoffmann L.
240	Transfer of Zn from dredged toxic sediments to a soil: first characterization of the sediment	Isaure, M.P. Laboudige A. Lecomte P. Manceau A. Tiffreau C.
867	The distribution of Cd in five fractions of sewage sludge after eight months aerobic and anaerobic incubation	Kaewrahn S. Balik J. Tlustos P. Szakova J. Balikova M.
850	Biosolids as zinc source for soybean	Lavado R. Rodriguez M.B.
775	Chromium in soil and sorghum plants as affected by sewage sludge enriched with the metal	Marchiori Jr. M. Melo W.J. Bertipaglia L.M.A. Melo G.M.P.
839	Heavy metals accumulation in sugarcane plants as affected by sewage sludge	Marques M.O. Melo W.J. Bellingieri P.A. Marques T.A. Brito O.R.
891	Sewage sludge as component of ration to bovines	Melo G.M.P. Bertipaglia L.M.A. Vieira P.de F. Melo W.J.
480	Effect of sewage sludge associated with Cd on sorghum plants.	Melo W.J. Pereira M.L. Muraoka T. Marques M.O. Melo G.M. Peruca V.
773	Determination of the binding characteristics on Zn in soils amended with biosolids	Merrington G. Smith M.T.E.
845	Reducing the heavy metals toxicity in sludge amended soil using VA mycorrhizae	Radwan S.M.A.
793	Metals in legumes grown on soil amended with urban sewage sludge in the field under semi-arid climatic conditions	Rejeb S. Gharbi F. Bahri A. Ghorbal M.H. Morel J.L.
799	Evaluation of heavy metal pollution on barley crop by agricultural use of different biosolids	Solero-Rovira P. Garcia-Gil J.C. Polo A.
930	Metal solubility in a biosolid amended soil	Vanderspiegel R.C. Evans L.J.
153	Uptake and accumulation of Zn from sewage sludge amended soil	Wan, C.K. Wong J.W.C.
173	Sewage sludge compost as a growth medium for tomatoes	Warman P.R.

## S9 – Kinetics & Mechanisms of Metal Sorption/Release on Natural Materials

### Oral Presentations (Room VI)

#	Title	Authors
<div>Part 1</div> <div>Chair: H. Magdi Selim</div> <div>July 13, 08:00-10:15</div>		
	Introduction (8:00-8:15)	H.M.Selim
895	EXAFS study of mercury bonding to goethite with adsorbed humic acid	Hesterberg D. Zhou W. Hutchinson K.J. Sayers D.E.
1087	Adsorption mechanisms of Pb on amorphous silica: an XAS study	Elzinga E.J. Sparks D.L.
446	Competitive sorption of Cu and Pb to hematite: Macroscopic modeling, and EXFAS results	Kretzschmar R. Christl I. Zhou W. Hesterberg D. Sayers D.
1088	Kinetics of oxyanion sorption on metal oxides: a time-resolved ATR-FTIR spectroscopic study	Peak J.D. Sparks D.L.

Part 2			Chair: H. Magdi Selim	July 13, 10:45-12:45
459	Competitive retention and transport of vanadium in soils	Wang K. Selim H.M.		
42	A kinetic approach to the speciation of trace metals in soils	Bermond A. Ghestem J.-P.		
284	Extended Freundlich isotherms for metal sorption in soils: Relations to soil and metal parameters.	Welp G. Brümmer G.W.		
701	Modelling the activity of metal ions (Cd, Zn, Cu) in soil solutions of some contaminated soils: Comparison of an adsorption and a speciation model	Bril J. Groenenberg J.E.		
Part 3			Chair: Donald L. Sparks	July 13, 16:00-18:30
847	Adsorption/desorption hysteresis of trace metals with soil components: a dynamical systems approach	Kingery W.L. Oppenheimer S.F. Han F.X. Selim H.M.		
1062	Simulated in-situ chemical immobilization of heavy metals in contaminated soils	McGowen S.L. Basta N.T.		
99	Lability of heavy metals in soils: role of soil properties	Yin Y. You S.-J. Allen H.E.		
220	Sorption-desorption processes of Selenium in soils of mediterranean areas.	Pezzarossa B. Piccotino D. Petruzzelli G.		
241	Mobility and speciation of arsenic in contaminated soils from two different industrial sites.	Matera V. Le Hecho I. Thomas P. Lecomte P.		

## S10 - Metal-Organic Interactions

### Oral Presentations (Room I)

#	Title	Authors
<b>Part 1</b>		
<b>Chair: Ronald Sletten</b>		<b>July 15, 08:00-10:15</b>
	Introduction (8:00-8:15)	R.S. Sletten
1157	Pathways of metal mobilization by humic and fulvic acids studied using natural organic matter	Sletten R.
759	Oxidative diagenesis of metal binding structures in natural organic matter	Leenheer J.A.
49	Kinetics of lead adsorption on iron oxides formed under the influence of citric acid.	Liu C. Huang P.M.
211	DOC induced desorption of cadmium and copper from soils.	Strobel B.W. Hansen H.C.B. Andersen M. Raulund-Rasmussen K.
<b>Part 2</b>		
<b>Chair: Nicola Senesi</b>		<b>July 15, 10:45-12:45</b>
937	Cu(II) complexation capacity of litter leachates and soil solutions in acid forest soils	Titeux H. Brahy V. Delvaux B.
705	Complexation and competitive sorption of strontium by humic acid on different backfill clay minerals	Chen T.-F. Doong R.-A.
650	Time dependent transformations of heavy metal binding onto organic matter	Twardowska I. Kyziol J.
109	Characteristics of compost-derived humic substances and their reactions with Pb, Cu, Cd, and Zn.	Wang M.C. Huang C.C.

### Poster Presentations

#	Title	Authors
<b>July 15, 14:00-15:30</b>		
709	Influence of humic acid on the sorption of arsenate on kaolinite	Christl I. Knecht K. Kretschmar R.
656	Humic acids as natural ligand, their acid-base properties and interactions with trace metals	Demin V.V. Zavarzina A.G. Orlov D.S.
947	Organo-metallic complexes in an andic soil seequence from the romanian north-eastern carpathians (Romania)	Donisa C. Steinnes E. Mocanu R.
182	Heavy metal dynamics in spruce (Picea abies) needle litter during decomposition	Lomander A. Johansson M.-B.
177	Effect of organic wastes on soil metals: simulation by using homogeneous soil columns	Madrid L. Diaz-Barrientos E.
856	C in the organic fractions and available of lead in soil contaminated with lead and cultivated with black oat	Silva E.T. Melo W.J. Teixeira S.T. Leite S.A.S.
651	Binding Strenght and Mechanism of Chromium Adsorption onto Peat	Twardowska I. Kyziol J. Schmitt-Kopplin P.
287	Humic acid from endemic areas of arsenicosis in Inner Mongolia and of blackfoot disease in Taiwan – a comparative study	Yu X.

## Technical Sessions

### T1 - Analytical Tools

#### Oral Presentations (Room III)

#	Title	Authors
<b>Part 1 Chair: Gerhard Stingeder July 14, 17:00-18:00</b>		
691	Use of chemical and physical fractionation to assess cadmium in some soils of the Swiss Jura	Benitez L.N. Dubois J.-P.
1116	Measuring ageing of metal contaminants in soil using isotopic tracers and delta L values	Cook N. McLaughlin M.J. Hamon R.E. Correll R.
1098	The usage of isotope ratio determinations in soil sciences	Latkoczy C. Prohaska T. Watkins M. Stingeder G. Teschler-Nicola M. Wenzel W.W.
973	Substrate- and elementspecific relation of real total versus aqua regia soluble contents of heavy metals in soils	Utermann J. Düwel O. Gäbler H.E. Hindel R.

### Poster Presentations

#	Title	Authors
<b>July 14, 14:00-15:30</b>		
131	The determination of heavy metals in certified environmental samples by microwave digestion and ICP-AES, ICP-MS and GF-AAS	Baffi C. Bettinelli M. Benne G.M. Spezia S. Silva S.
669	A sequential chemical extraction protocol for the simultaneous evaluation of arsenic and cadmium mobility	Cannizzaro V. Wasserman A. Woller A. Bourg A.

## T2 - Trace Elements in Agricultural Ecosystems

### Oral Presentations (Room V)

#	Title	Authors
<b>Part 1</b> <b>Chair: Bill Bertl</b> <b>July 12, 14:00-15:30</b>		
429	Atmospheric deposition of heavy metals onto agricultural land in England and Wales	Alloway B.J.
422	Distribution of Copper in Champagne vineyards soils, as influenced by organic amendments.	Besnard E. Chenu C. Robert M.
271	Effect of long-term fertilization on the Cd and Pb content of different soils types	Debreczeni K. Kismányoky T. Takacs L.
927	Environmental transfer of copper in calcareous agricultural soils	Garcia-Rizo C. Perez-Sirvent C. Martinez-Sanchez J.
155	Determination of Mn and Cu efficiency of crop plants in pot experiments.	Krähmer R. Sattelmacher B.
148	The accumulation and leaching of fertiliser-derived cadmium in a New Zealand Podzol Soil	Zanders, J.

### Poster Presentations

#	Title	Authors
<b>July 13, 14:00-15:30</b>		
690	Cadmium and zinc fluxes and balances in organic and conventional dairy farming - preliminary results	Bengtsson H. Öborn L. Andersson A. Nilsson I. Steineck S. Jonsson S.
994	Does vineyard cultivation affect copper accumulation in soil?	Capri E. Beltrami P. Boccelli R. Cattani I.
1148	Effects of acidification and iron enrichment of calcareous soils on plant nutrition	Matocha J.E. Moseley D.W.
618	Evaluation of Critical Limits of Trace Elements Zn, B and Mo in Bangladesh Agriculture	Miah M.M.
1084	Differences in the assimilation of lead and cadmium by vegetables cultivated under traditional and ecological conditions.	Murcia A. Martinez-Tomé M. Gutierrez F. Martinez-Sanchez M.J. Pérez-Sirvent C. Vidal J.
1124	Microelements content in agricultural soils of central Italy: a comparison after eight years	Panusa A. Spadoni M. Lorenzoni P. Raglione M. De Simone C.
206	Effect of copper spray chemistry on apple fruit russetting and leaf tissue copper status	Peryea F.J. Kammereck R. Fairchild G.
85	Effect of slow release zeolite-bound Zn and Cu fertilizers on Cd content in wheat	Puschenreiter M. Horak O.
351	Status of some micro-nutrients on soils of Madhupur Tract in Bangladesh	Rahman M.H. Hossain M.F. Bhuiyan M.M.A. Elahi S.F.
145	Effect of fungicide sprays on the copper content in soils	Reyzabal M.L. Andrade M.L. Marcet P. Montero M.J.
1077	Effect of irrigation scheduling on cadmium uptake by lettuce	Stevens D. McLaughlin M.J.
810	Trace metals in soils of agricultural land of Poland	Terelak H. Kabata-Pendias A.

### T3 - Trace Element Interactions with Humans & Animals Poster Presentations

#	Title	Authors
<b>July 14, 14:00-15:30</b>		
230	Influence of sodium and barium selenite on selenium content in some organs in sheep.	Bik D. Kondracki M. Szkoda J.
926	Antagonistic relationships between selenium and magnesium in sheep	Bik D.E.

### T4 - Trace Elements in Aquatic Ecosystems & Sediments Oral Presentations (Room I)

#	Title	Authors
<b>Part 1 Chair: Brian Davies July 12, 14:00-15:30</b>		
1174	Total and extractable trace metals in river sediments of the Nahr-Ibrahim river, Lebanon	Korfali S.I. Davies B.E.
699	Dredged iron-sulfide rich sediments at Rio de Janeiro Lagoon System, Brazil	Borma L.de S. Ehrlich M. Barbosa M.C.
737	Variations in levels and speciation of trace metals in mine polluted rivers in the Roros area, Norway	Gundersen P. Steinnes E.
776	Silver concentration in sediments in the gulf of Finland: origin and bioavailability to biota	Mukherjee A.B. Verta M. Lehtoranta J. Järvinen O.
28	The mobilisation of trace elements between plants, water and sediments in aquatic ecosystems	Omote J.
844	Physiological characterisation of cadmium uptake in water hyacinth (Eichhornia Crassipes)	Rivetta A. Espen L. Sacchi G.A. Cocucci M.

### Poster Presentations

#	Title	Authors
<b>July 13, 14:00-15:30</b>		
223	Biogeochemical assessment of trace metals in river sediments	Bhand S.G. Chaturvedi K.K.
233	Cadmium transport and speciation in River Sinos (Southern Brazil)	Casartelli M. Mirlean N. Baisch P.
203	Geographical variation of trace metal associations in sediments from major rivers in eastern China	Chen J.S. Wang F.Y.
685	Accumulation of heavy metals in sediments: temporal variation	Fernandez Feal M.L. Marcet Miramontes P. Andrade Couce M.L. Montero Vilarino M.J.
6	Hg forms in natural, urban soils and bottom sediments of the middle Amur	Kot F.S. Matyushkina L.A. Rapoport V.L.
349	Trace metal distribution in sediments of northern Dwina estuary, Russia	Koukina S. Sadovnikova L. Hummel H. Calafat-Frau A.
743	Distribution of heavy metals in sediments of the Keelung river (Taiwan): effect of grain size	Lin J.-G. Chen S.-Y.
291	Arsenic distribution in surface sediments of Saco do Engenho Inlet and dispersion to Sepetiba Bay, RJ, Brazil	Magalhaes V.F. Pfeiffer W.C. Carvalho C.E.V.

234	Copper partition to water within suspension experiment for sediments of Patos Lagoon (Brazil)	Mirlean N. Baisch P. Vanz A.
472	Preliminary assessment of water fern (Salvinia) plants for uptake of Cd, Al, Mn, and Fe	Ornes W.H. Sajwan K.S. Taylor R.W. Guisti S. Madden K.
851	Extent of pyritization of trace metals in sediments from Guaymas Basin, Gulf of California	Otero Pérez X.L. Huerta-Díaz M.A.
822	Some problems for the speciation of heavy metals in marine sediments	Perez-Sirvent C. Martinez-Sanchez J. Gil M. Vidal J. Hernandez-Cordoba M.
336	Sucession of phytoplankton and fungi communities under the effect of toxic metals.	Petrova N.A.
401	Total and dissolved elements in superficial waters of the Antarctic peninsula	Prendez M. Carrasco M.A. Alcota C.
348	Trace metal study of three major north-western arctic estuaries	Sadovnikova L. Koukina S. Hummel H. Calafat-Frau A.
1064	Accumulation of biogeochemical pollutant in the floodplain sediments of Yamuna River (tributary of Ganga) during recent past.	Saxena D.P. Subraimian V.

## T5 - Bioavailability of Trace Elements

### Oral Presentations (Room IV)

#	Title	Authors
<b>Part 1</b> <b>Chair: Satish Gupta</b> <b>July 13, 08:00-10:15</b>		
1057	Plant availability of cadmium in Brazilian simple superphosphates	Prochnow L.I. Abreu M.F. Plese L.P.M. Corrente J.E.
1023	Field test of amendments to reduce the in situ availability of soil lead	Brown S.L. Chaney R. Berti B.
712	The difference among plant species to access nutrient and trace metal elements in soils determined using a radioactive isotope dilution method	Cook N. McLaughlin M.J. Wilhelm N. Cozens G.
14	The role of basal roots in the supply of cadmium to the tuber of potato ( <i>Solanum tuberosum</i> L.)	Dunbar K.R. McLaughlin M.J. Reid R.J.
100	Chemical mobilization and acquisition of copper, zinc and cadmium by <i>Lupinus albus</i> L. and <i>Triticum aestivum</i> L.	Gerke J. Wessels E. Römer W.
272	Effect of phosphors and other soil amendments on soil lead, cadmium, and zinc bioavailability.	Hettiarachchi G.M. Pierzynski G.M.
404	Heavy metal uptake by lettuce ( <i>Lactuca sativa</i> L.) from different soils and the relationship between mobile soil heavy metals and plant contents	Horak O. Schurawitzky K.
305	Zinc availability in contaminated soils as a function of plant (willows) growth and additive (NH <sub>4</sub> CL)	Keller C. Hammer D. Kayser A. Schulin R.
1108	Effect of nutrient solution composition and buffered Cd <sup>2+</sup> on yield and Cd levels in rice grain	Kukier U. Chaney R. L.
<b>Part 2</b> <b>Chair: Franc Lobnik</b> <b>July 13, 10:45-12:30</b>		
945	The effects of soil treatment and plant species on root growth and metal uptake in zinc-contaminated soils	Palazzo A.J. Lee C.R.
1094	Effect of soil acidification by fertilizer application on heavy metal mobility: uptake by willow and leaching	Schremmer D. Schmidt U. Kaupenjohann M.
876	Where do plants take up their nickel from?	Shallari S. Echevarria G. Morel J.L.
288	Liming reduces cadmium uptake from soil: Why doesn't it work better?	Smolders E. Bissani C. Helmke P.A.
814	Contamination and bioavailability of heavy metals along	Tsai H.-C. Doong R.-a Chang S.-m

	urban-rural land-use in central Taiwan	
431	Increased zinc-extraction potential of maize by enhancing metal availability in soil	Wenger K. Gupta S.K.
108	Assessment of soil-plant relationship using methods of multivariate regression	Zupan M. Einax J.W. Kraft J. Lobnik F. Hudnik V.
997	New and simple model of the uptake of trace elements from soil by oral route in Snails	Gomot-de Vaufléury A. Pihan F.

### Poster Presentations

#	Title	Authors
<b>July 13, 14:00-15:30</b>		
681	Biomass uptake related depletion of soil Cd in a tree species experiment on farmland in Sweden	Alriksson A. Alriksson B. El Make M.
1149	Mercury levels in natural soils and two plant species ( <i>Spartium Junceum</i> L. and <i>Avena Sativa</i> L.) in Latium (Central Italy)	Angelone M. Cavaliere A. Dowgiallo G.
582	Uptake and Distribution of Cd in Cucumber Plants as Affected by Nitrogen Forms.	Arafat S.M.
689	Trace elements uptake by wheat grains depending on soil types (QUASAR programme)	Baize D. Mench M. Sagot S. Sterckeman T.
428	Parameters of heavy metals bioavailability in soil.	Bielek P. Matuskova L.
251	Effect of liming on Cd and Pb uptake by Sudangrass ( <i>Sorghum sudanese</i> (Piper) Stapf)	Cordovil C.M.d.S. Coutinho J.F. Neto M.M.P.M.
322	Influence of soil pH change on soil AAAC-EDTA extractable zinc, foliar zinc concentration, and zinc uptake by clover plants	Domingues H. Menino M.R. Serrao M.G. Balsa M.E. Monteiro O. Pedra F. Cravo M.L. Rodrigues M.J.
721	Influence of chromium on the uptake of Mn, and Fe by radish ( <i>Raphanus sativus</i> )	Fernandes M.L. Calouro F. Abreu M.M.
842	The effect of plant residues on trace elements bioavailability from contaminated soils	Grzebisz W. Diatta J.
303	Heavy metal concentration in wheat and soils of the Talas and Naryn valleys of Kirgistan	Helal M. Upenov A. Baibagyshev E. Weigel H.-J.
269	Effects of liming on Cd species in soil solution and uptake of Cd in potatoes	Jansson G. Öborn I. Berggren D.
589	Bioavailability of heavy metals in soils in the vicinity of metal mining area, South Korea	Kim K.-W. Kim K.-K.
753	Mobility and availability of metals to plants	Kovalevskii A.L.
71	Trace metals content in corn grown in Argentina	Lavado R.S. Rodriguez M.B. Taboada M.A. Alvarez R. Alconada M. Zubillaga M.S. Porcelli C.A.
270	The cadmium uptake by maize as influenced by soil pH and cadmium content	Lehoczky E. Szabo L. Albrecht G.
899	Copper and nickel accumulation in <i>Empetrum nigrum</i>	Monni S. Salemaa M. Uhlig C.
1039	Uptake of Cd <sup>2+</sup> by <i>Sorghum bicolor</i>	Mota A.M. Pinto A.P. de Lurdes Gonçalves M. Varennes A. de
780	Effects of pH and liming on trace element contents in spring wheat and potatoes	Öborn I. Johnsson L. Eriksson J. Jansson G. Andersson A.
311	Effects of chemical form of nitrogen source on heavy metal uptake by higher plants.	Ohtani T. Fukami M. Kawabata M. Sase A.
1118	Zinc and manganese in soil and in tops and roots of two forage legumes grown in a soil with four base saturation levels	Premazzi L.M. Mattos H.B. Monteiro F.A.
789	Cadmium uptake and accumulation characteristics in a range of vegetable crops	Punshon T. Lepp N.W. Alloway B.J.



122	Actinides bioavailability in soils.	Roussel-Debet S. Colle C. Hurtevent P. Morello M.
974	Accumulation of heavy metals by Sesbania species	Sahi S.V. Fasion V. Pavlostathis S.
952	Beryllium accumulation in soybean plants	Sajwan K.S. Ghuman G.S. Ornes W.H. Youngblood T.V. Alva A.K.
405	Cadmium availability in agricultural soils assessed by the isotopic exchange kinetic technique	Sappin-Didier V. Mench M.
1176	Effect of lead applied to a Brazilian Oxisol on dry matter production and metal uptake by black oat ( <i>Avena spp</i> )	Santos A.C.C. de Melo W.J. de Souza W.J. de O. Ribeiro M.C.
968	Effect of long-term application of wastewater on bioavailability to trace elements	Shehata A.E.R. Lateef E.A.E. Hall J.E.
803	Phytochelators in relation to grain cadmium accumulation in wheat	Stolt P. Bryngelsson T. Lundborg Tl
869	Extractability and plant-availability of soil As and Cd in dependence on soil properties	Szakova J. Tlustos P. Balik J. Pavlikova D. Balikova M.
23	Influence of soil pH on cadmium uptake by tobacco	Tsadilas C.D.

## T6 – Biogeochemistry, Distribution & Fractionation of Trace Elements

### Oral Presentations (Room IV)

#	Title	Authors
<b>Part 1 Chair: Alina Kabata-Pendias July 12, 14:00-15:30</b>		
344	Small-scale variability of metals in soil.	Einax J.W. Kraft J.
464	Mercury and other trace metals distributions in the Strengbach basin (Vosges Mountains, France)	Fevrier C. Stastna M. Prudent P. Probst A. Party J.P. Probst J.L.
733	Fractionation of cadmium in some New Zealand Soils	Gray C.W. McLaren R.G. Roberts A.H.C. Condron L.M.
250	Heavy metals in floodplain soils – distribution and bioavailability, National Park „Lower Odra Valley“, Northeast Germany	Höhn A. Hierold W. Prietzsch C. Schalitz G.
197	An application of disjunctive kriging for delineation of heavy-metal contaminated soils	Juang K.-W. Lee D.-Y.
198	Comparison of three nonparametric kriging methods for delineating heavy-metal contaminated soils.	Lee D.-Y. Juang K.-W.
<b>Part 2 Chair: Gerd Brümmer July 12, 16:00-18:15</b>		
1180	General perspective of trace elements in soils of France: Stocks, fluxes and risks (last minute paper - not included in proceedings)	Robert M. Bourrelie P.H. Berthelin J.
758	Geochemical behaviour of toxic metals in the rock-soil-plant system in areas underlain by black shales of the okchon zone, Korea	Lee J.-S. Chon H.-T. Kim K.-W.
353	Trace elements availability in weathered soils from Paraná, Brazil	Lucchesi L.A.C. Logan T.J.
804	Biogeochemical cycling of selenium: The ocean as a source of Se to terrestrial ecosystems	Steinnes E.
1072	The approaches to amelioration of Se ecocycle in Se-deficient biogeochemical area and its effects on Se dietary intake and health in China	Tan, J. Wang, W. Yang, L. Zhu, W. Li, R. Hou, S.
146	Background levels of trace and ultra-trace elements in soils of Japan	Yamasaki S.-i. Takeda A. Nanzyo M. Taniyama I. Nakai M.



1046	Mobilisation of heavy metals from polluted soils as affected by pH and other factors	Karczewska A.
1060	Natural mercury emissions: revised estimates and the global balance	Levin L. Allan M.A.
587	Bioavailability of particulate metals to fish gills	Tao S. Liu C.F.

### Poster Presentations

#	Title	Authors
<b>July 13, 14:00-15:30</b>		
687	Biogeochemical pathways of pollutant elements as aids in environmental mitigation	Aswathanarayana U.
1155	Trace metals in the Berlin Metropolitan Area	Birke M. Rauch U.
1038	Biogeochemistry of trace metals at the chunky gabbroic/ultramafic site, North Carolina, USA	Andersen B.C. Pollard A.J. Wheeler S.K.
1002	Cerium precipitates into groundwater nodular ferricretes under cretaceous sandstones in SE-Brazil	Coelho M.R. Vidal-Torrado P.
870	Distribution and mobility of Zn and copper in arable soils of Wieklopoliska Lowland, studied by sequential extraction	Dabkowska-Naskret H.
684	Metal distribution in soils from two marshes. A statistical approach	Fernandez Feal M.L. Andrade M.L. Villaverde C. Marcet P. Reyzaal M.L. Montero M.J.
727	Iodine and bromine contents of some Austrian soils and relations to soil characteristics	Gerzabek M.H. Muramatsu Y. Strebl F. Yoshida S.
1074	Determination and regional distribution of Au, Pd, Pt and Rh in humus and moss samples in European arctic	Niskavaara, H. Kontas, E. Reimann, C.
1085	Determination of methyl- and inorganic mercury in organic soils of a boreal forested catchment	Qian J. Skjellberg U. Frech W.
1163	Spatial Analysis of a biogeochemical anomaly, particularly Hg, in a wetland environment, Nova Scotia, Canada	Rencz A. Temer K. Sangster A. Smith P. Kilza D.
1119	Biogeochemical characterization of coal slurry and tracking of selenium in the black mesa pipeline	Rostad A.P. Foust R.D. Southam G.
855	Geostatistics and cluster analysis for source assessment of metals in soils from southeast Mexico	Siebe C. Cram S. Webster R. Ainsworth C.
290	Antagonistic and synergistic interactions between aluminium and manganese at low ionic strength.	Taylor G.J. Blamey F.P.C. Edwards D.G.
95	Cr, Ni and Co in a tropical secondary native vegetation under ultramafic (serpentine) soils in SE-Brazil.	Vidal-Torrado P. Rodrigues R.R. Calvo R. Macias F.
1045	Preliminary study on heavy metal forms in soils of degraded and non-degraded ecosystems in the Sudety Mts.	Weber J. Karczewska A. Drozd J. Dradrach A.
963	Some trace elements in soils and plants of Bieszczady mountain meadows environment	Wozniak L.
1173	Behavior of trace elements in soils of a coastal zone of the rising Caspian Sea	Kasimov N.S. Lychagin M.Y.
807	Sensitive determination of three arsenic species in water by ion exclusion chromatography-hydride generation-inductively coupled plasma mass spectrometry	Taniguchi T. Tao H. Tominaga M. Miyazaki A.

## T7 - Trace Elements in Forest Ecosystems

### Oral Presentations (Room II)

#	Title	Authors
<b>Part 1</b> <b>Chair: Peter Blaser</b> <b>July 14, 08:15-10:00</b>		
1044	Large scale biogeochemical anomalies in forests of Canada: Anthropogenic or natural in origin?	Dunn C.E.
244	Binding of trace metal cations to wood of pine ( <i>Pinus sylvestris</i> ) and oak ( <i>Quercus petraea</i> ) trees	Hagemeyer J.
156	Four different extraction methods to assess bioavailability of some heavy metals in forest soil from Norway	Kjobli L. Steinnes E.
765	Aluminium speciation in acid forest soil solutions: comparison of different methods	Luster J. Pena-Rodriguez M. Heim A. Blaser P.
777	Mobility of Cu, Mn, Zn and Cd in a pine forest as affected by liming and acidification	Myrtveit I. Berthelsen B.O. Steinnes E.
315	Canopy filtration of copper, nickel and zinc near the Harjavalta Cu-Ni smelter, SW Finland	Nieminen T. Derome J. Helmisaari H.-S.
811	Trace elements return through leaf litter and their relations with poplar ( <i>populus deltoides</i> ) tree growth under different management practices	Thind H.S. Arora C.L. Khera K.L. Kumar R.

### Poster Presentations

#	Title	Authors
<b>July 14, 14:00-15:30</b>		
751	The storage and flows of cadmium in the system soil-energy forest with emphasis on experimental methods	Klang E. Eriksson J. Perttu K.
188	Micronutrients in soils, precipitation, and soil solution of native savanna and pinus reforestation in Central Brazil	Lilienfein J. Wilcke W. Ayarza M.A. Vilela L. Carmo Lima S. do Zech W.
783	Do elevated levels of Ca and heavy metals in soil water, due to ash treatment, affect tree growth?	Österas A.H. Greger M.
802	Trace metal budgets for a small forested catchment	Starr M. Ukonmaanaho L.

## T8 - Trace Elements in Industrial & Municipal Residues and Urban Environments

### Oral Presentations (Room IV)

#	Title	Authors
<b>Part 1</b> <b>Chair: Albert Page</b> <b>July 14, 08:15-10:15</b>		
1024	The phytoavailability of zinc and cadmium in long-term biosolids-amended soils	Brown S.L. Chaney R. Ryan J.A.
294	Distribution and translocation of arsenic in soils of tannery infiltration fields	Gerth J. Dankwarth F.
1033	Trace element mobility following land application of pulp mill residues to a forest soil	Goldmund H. Morris L.A. Miller W.P.
21	Mobility of potentially toxic elements in solidified-stabilized wastes and contaminated soils	Humez A.-L. Prost R.
882	Speciation of soluble and colloidal Cd and Zn in	Huber K. Lamy I. Denaix L. van Oort

	groundwater under industrial waste land	F.
979	Major and trace element solubility from land application of fly ash and organic wastes: an incubation study	Jackson B.P. Miller W.P.
749	Cadmium binding by fractions of organic matter extracted from municipal solid waste compost	Kaschl A. Römhild V. Hadar Y. Chen Y.
427	Acid mine drainage abatement with flue gas desulfurization byproducts: weathering study	Laperche V. Traina S.J.
<b>Part 2                      Chair: Luis Madrid                      July 14, 10:45-12:30</b>		
761	Utilization of steel mill lime cake on acidic sugarcane land	Liu W.C. Li S.W. Chang J.Y. Yao T.P.
763	Stabilization of APC-Residues with FeSO <sub>4</sub>	Lundtorp K. Jensen D.L. Sorensen M.A. Mogensen E.P.B. Christensen T.H.
1127	Effect of Zn on the microbial biomass content of sewage sludge-treated soil	Smith S.R. Alloway B.J. Nicholson F.A.
940	Binding of trace metals to iron oxides – stabilization of incineration residues	Sorensen M.A. Stipp S.L. Jensen D.L. Hochella M.F.Jr. Lundtorp K. Christensen T.H.
732	Effect of biosolid treatment on metal transport following application to agricultural soils	Gove L. Beck A. Nicholson F.
1007	Reduction of urban residential lead exposure: Baltimore's experience, USA	Farfel M.R. Brophy M. Orlova A.O. Chisolm J.J.Jr.
801	Heavy Metal contents in urban and industrial soils	Schwartz C. Fetzner K.D. Florentin L. Kubiniok J. Morel L.

### Poster Presentations

#	Title	Authors
<b>July 14, 14:00-15:30</b>		
677	Heavy metal phytoavailability estimated by DTPA extraction in an OxySol incubated with municipal refuse compost	Abreu, M.F. de Berton, R.S. Abreu, C.A. de
848	Soil metal availability as affected by urban waste compost application and some soil properties	Abreu Jr. C.H. Muraoka T. Giné F.
993	The assessment of economic and environmental impacts in Northern Italy of a new water purification system	Beltrami P. Capri E. Hancock I.C.
991	Influence of compost from municipal wastes (MSWC) on the contents of some heavy metals in soil and plant	Drozd J. Jamroz E. Licznar M.
1022	Upper Arkansas River ecological restoration: Biosolids demonstration project, Leadville, Co.	Henry C.L. Brown S.L. Compton H. Chaney R.
746	Species of Cd, Zn, and Pb applied by smelter flue-dust to a soil	Kabata-Pendias A. Piotrowska M.
1013	Agricultural use of irradiated sewage sludge: effects on clover and grass dry matter production	Mendes Ferreira E. Castro I.V.
1015	Agricultural utilisation of urban sewage sludge: metal trace elements in soils and plants	Piquet-Pissaloux A. Tartiere S. Mullie A.
1055	The effect of sewage sludge fertilisation on the heavy metals behaviour in soil-plant system: a long term experience	Rossi G. Bellicioni S. Felici B. Figliola A.
320	Heavy metals uptake by subterranean clover and soil heavy metals extractability in soils treated with an kline industrial residue	Serrao M.G. Balsa M.E. Dominiques H. Fernandes M.
617	Manganese elevation in landfill cover soils: preliminary investigation	Trotter D.H. Cooke J.A.

996	Formation and dissolution of lead phosphate in household dust	Zarcinas B.A. McLaughlin M.J. Maynard E. Calder I.
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## T9 - Microbial & Enzymatic Interactions

### Oral Presentations (Room VI)

#	Title	Authors
<b>Part 1</b> <b>Chair: Pan Ming Huang</b> <b>July 12, 14:00-15:30</b>		
1089	Field-measured oxidation rates of biologically reduced selenium in sludge	Benson S.M. Daggett J. Zawislanski P.
864	Pyrogallol inhibition of Al-13 tridecamer formation and the synthesis of humic substances	Krishnamurti G.S.R. Wang M.K. Huang P.M.
1059	Biological activity of soils in metal contaminated ecosystems	McCarty G.W. Stczynski T.I. Siebielec G.
365	Role of ferri-reducing bacteria in trace element mobility in soil and river sediment	Quantin C. Becquer T. Belguy G. Munier-Lamy C. Berthelin J.
1049	Mechanisms of membrane permeation by trace metals	Reid R.J. McLaughlin M.J. Dunbar K. Barritt A.R.

### Poster Presentations

#	Title	Authors
<b>July 13, 14:00-15:30</b>		
890	Soil microbial biomass and amylase activity in a soil treated with sewage enriched with Cr	Bertipaglia L.M.A. Melo G.M.P. Melo W.J.
383	Effect of Zinc and Lead in fermentative activity of calcareous soils	Birukova O.A. Belyeva O.N.
904	Role of soil microorganisms in biochemical fluorine cycle in ecosystems under contamination	Grishko V.N.
447	Effect of Cadmium, enzyme activities, I/D-Amino acid respiration ration as affected by cadmium in a forest soil	Landi L. Renella G. Moreno J.L. Falchini L. Nannipieri P.
1111	Hexavalent chromium reduction by bacteria isolated from a tannery contaminated soil	Megharaj M. Avudainayagam S. Naidu R.
910	The effect of soil fungi on copper, nickel and zinc availability in polluted podzols	Rudiyak A.Y. Motuzova G.V. Marfenina O.E.
857	Microbial biomass in a soil contaminated with increasing rates of Pb, cultivated with black oat (Avena spp)	Teixeira S.T. Melo W.J. Silva E.T. Cheli R.A.

## T10 - Mobility & Transport of Trace Elements

### Oral Presentations (Room II)

#	Title	Authors
<b>Part 1</b> <b>Chair: Herbert Allen</b> <b>July 14, 10:45-12:45</b>		
82	Mobilisation and immobilisation of Al and Mn in the acidic soil.	Badora A. Filipek T.
998	Mobility of copper, zincum and cadmium in a loamy soil	Capri E. Boccelli R. Beltrami P. Cattani I.
260	Mobilization of trace metals in acid treated contaminated soils.	Csillag J. Lukacs A. Bujtas K. Nemeth T.

1113	Leaching of chromium (VI) from soil profiles contaminated with tannery wastes	Kookana R.S. Naidu R. Mowat D. Riley G. Smith L.
452	Leaching of lead from soils contaminated with Lead shot.	Rooney C.P. McLaren R.G.
805	Leaching behavior of heavy metals in surface soils derived from dredged sediments	Tack F. Singh S.P. Verloo M.
932	Solubility of native and applied molybdenum in surface coal mine disturbed soils	Wang L. Reddy K.J. Munn L.C.
1114	Chromium mobility in tannery contaminated soils: effect of solution composition	Avudainayagam S. Naidu R. Kookana R.S. Alston A.

### Poster Presentations

#	Title	Authors
<b>July 14, 14:00-15:30</b>		
1026	Downward migration rate in soils of heavy metals and its control by soil properties	Facchinelli A. Gallini L. Celi L. Marsan F.A. Hursthouse A.
1107	Metals solubility in two contaminated soils treated with lime or compost	Grzegorz S. Chaney R.L.
107	Lead desorption and remobilization in contaminated sites induced by soil colloids	Karathanasis A.D.
132	Mobilization of Zn and Cd in three Swiss soils by use of elemental sulphur	Kayser A. Schulin R. Felix H.R.
823	Effect of salinity on the heavy metals mobility in calcareous fluvisols	Martinez-Sanchez J. Perez-Sirvent C. Vidal J. Marin P.
274	Mobility and speciation of metals in the steppe-zone soils	Minkina T.M. Samokhin A.P.
385	Mobility of Cu in soil columns as affected by the presence of the pesticide Glyphosphate.	Morillo E. Maqueda C. Martin V.
914	Mobility and availability of micropollutants in calcareous soils	Morvai B. Kadar I. Nemeth T.
1165	Strontium, cesium, and chromate transport in zeolited tuffs from the Nevada Test Site, Nevada, U.S.A.	Papelis C., Um W.
881	Evidence concerning the recycling of particulate matter due to rain and vehicle circulation	Prendez M. Cisternas M.
900	Experiments to estimate the mobility of selected anions in columns of agricultural soils	Sager M. Schoissengeier M.

### T11 – Modelling & Prediction of the Fate of Trace Elements Oral Presentations (Room V)

#	Title	Authors
<b>Part 1                      Chair: David Parker                      July 15, 11:30-12:30</b>		
265	Delineation of selenium cycling and ecosystem effects with field research and computer modelling	Carlton R.G. Porcella D.B.
1103	Predicting concentrations of Cd, Cu, Pb and Zn in the soluble and exchangeable phases of soils	Rieuwerts J.S. Thornton I. Farago M.E. Ashmore M.R.
813	Modelling of a redox-activated extraction of mercury contaminated soil in an integrated process	Thöming Jorg
818	Predicting cadmium transport in a non-calcareous soil from competitive sorption isotherms	Voegelin A. Vulava V.M. Kretzschmar R.

### Poster Presentations

#	Title	Authors
<b>July 15, 14:00-15:30</b>		
969	Modeling selenium transfer in a laboratory soil-plant system	Camps Arbestain M.
865	Modelling adsorption kinetics of Zn in soils of Tamil Nadu, India	Krishnasamy R. Mathan K.K.
902	Modelling Al(3+) in nutrient media for screening genotypes of aluminium tolerant Cynodon Dactylon	Ramgareeb S. Watt M.P. Cooke J.A. Marsh C.A.
406	Dynamic model for the electrodyalytic soil copper remediation.	Ribeiro A.B. Mexica J.T.
951	A model for electrodyalytik of chromium from soils	Ribeiro A.B. Mexica J.T.

### T12 - Biomonitoring & Risk Assessment Oral Presentations (Room Room II)

#	Title	Authors
<b>Part 1</b> <b>Chair: Laszlo Simon</b> <b>July 14, 16:00-18:00</b>		
683	Evaluation of poly(tetrafluoroethylene) porous cup soil solution samplers for heavy metal monitoring	Andersen M.K. Raulund-Rasmussen K. Westergaard B. Hansen H.C.B.
1061	In-vitro gastro-intestinal method to estimate bioavailable arsenic in contaminated soils	Basta N.T. Rodrigez R.R. Casteel S.W.
735	Risk of metal contamination in view of soil properties	Groenenberg J.E. Bril J. Vries W. de
141	Regional-scale assessment of heavy-metal accumulation in the Netherlands	Tiktak A. van Grinsven H. Otte J. Overbeek B.
66	Mapping soil metals in New Orleans: Preliminary comparison of two surveys	Mielke H.W. Smith M.K. Gonzales C.
786	Factors influencing heavy metal accumulation in different age segments of the moss Hylocomium splendens (Hedw.) B.S.G.	Pecchiari M. Franchi M. Pison S.
812	Potential risk estimations of heavy metal polluted sites by extraction schemes	Thörning J.
408	Ecological aspects of Zinc and Lead remediated post-mining areas.	Strzyszcz Z.

### Poster Presentations

#	Title	Authors
<b>July 14, 14:00-15:30</b>		
1017	Geophagy: a direct soil-animal geochemical pathway	Abrahams P.W.
53	Lead isotop composition in lichens from urban, rural and volcanic sites	Aiuppa A. Dongarra G. Monna F. Varrica D.
875	Phenolic compound build-up in pine as bioindicator of pollution	Alaimo M.G. Palmeri E. La Roussa C. Melati M.R.
782	PAH and heavy-metal biomonitoring program along the A32 motorway (North West Italy)	Ardito G. Badino G. Ostacoli G. Orsi M. Baker A.. Parodi A.
852	Risk elements inputs to agricultural soils - an evaluation in national and local scale	Sanka M.

935	Risk assessment of soil fluoride ingestion by cattle	Stevens D.P. McLaughlin M.J.
1132	Impact of fly-ash on some photosynthetic aspects in <i>Vicia faba</i>	Gupta M. Tripathi R.D.

### T13 - Phytoremediation & Metal Accumulation in Plants

#### Oral Presentations (Room IV)

#	Title	Authors
<b>Part 1 Chair: Ron McLaren July 14, 16:00-18:00</b>		
980	Disposal option for plants used in the phytoremediation of Se-Laden soils	Banuelos G.S. Mayland H.F.
1056	Establishment of a vegetative cap on a zinc smelter slag pile: greenhouse studies	Berti W.R. Chawla R.
941	Remediation of the jales minespoil by inactivation and phytostabilisation: on site experiments	Bleeker P.M. De Koe T. Assuncao A.L.
417	Selection of grass species and amendments for revegetation of Pb/Zn smelter wastes	Daniels W.L. Stuczynski T.I. Chaney R.L.
714	Heavy metal accumulation in metalicolous and non-metallicolous populations of <i>Arrhenaterum elatius</i> (L.)	Deram A. Anderson C. Robinson B. Brooks R.R. Van Halluwyn C. Petit D.
734	<i>Salix</i> as phytoextractor	Greger M.
573	Biotechnological Improved Plants - A Powerfull Tool for Phytoextraction of Heavy Metals from Polluted Soils.	Guadagnini M. Herzig R. Erismann K.-H. Müller-Schärer H.
201	Phytoextraction: the use of indian mustard and rape to remove Ti, Cd and Zn from contaminated soils	Lambrecht S. Biester H. Haag-Kerwer A.
<b>Part 2 Chair: Mike McLaughlin July 15, 08:15- 10:15</b>		
1027	Role of Selenium volatilization in the management of selenim-laden agricultural drainage water	Lin Z.-G. Zayed A. Terry N.
1029	Heterologous expression of heavy metal resistance genes in endophytic bacteria and colonization of their host plant in the perspective of phytoremediation	Lodewyckx C. Taghavi S. Van der Lelie D. Vangronsveld J. Clijsters H. Mergeay M.
180	Metal uptake by <i>Thlaspi caerulescens</i> and metal solubility in a Zn/Cd contaminated soil after addition of EDTA.	Luo Y.M. Christie P. Baker A.J.M.
861	The complexes of cadmium with phytochelatins. A quantum mechanics study	Manunza B. Deiana S. Pintore M. Solinas V. Gessa C.
1050	Effect of zinc and copper on cadmium uptake by <i>Thlaspi caerulescens</i> and <i>Cardaminopsis halleri</i>	McLaughlin M.J. Henderson R.
65	Increased selenate uptake, reduction and tolerance in transgenic <i>Brassica Juncea</i> plants	Pilon-Smits E.A.H. Leustek T. Terry N.
946	Overexpression of glutathione synthesizing enzymes enhances cadmium accumulation in <i>Brassica juncea</i>	Pilon-Smits E.A.H. Zhu Y.L. Pilon M. Terry N.
200	Heavy metal phytoextraction capacity of several agricultural crop plant species.	Simon L.
<b>Part 3 Chair: Robert Jandl July 15, 10:45- 11:30</b>		
933	Changed metal uptake in tobaccos transformed with <i>Escherichia coli</i> copper resistance gene <i>pcoA</i>	Tervahauta A.I. van der Lelie D. Mergeay M. Krenlampi S.O.
975	Metallothionein genes in copper sensitive and copper tolerant <i>Silene vulgaris</i> . Do they play a role in copper tolerance?	van Hoof N.A.L.M. Tervahauta A.I. Hakvoort H. Schat H. Verkley J.A.C. Ernst W.H.O. Hassinen V. KSrenlampi S.O.
884	Phytostabilization of mimicked cadmium cantaminated soil with lime ammendment	Wong J.W.C. Chen Q. Zhang F.S. Wong M.H. Baker A.J.M.



### Poster Presentations

#	Title	Authors
<b>July 15, 14:00-15:30</b>		
716	Will the Cd uptake by <i>Salix</i> result in redistribution of Cd between subsoil and topsoil ?	Ekvall L. Greger M.
723	Heavy metal accumulation in higher plants for use in stormwater treatment	Fritioff A. Greger M.
779	Chemical remediation and phytoremediation of soils containing heavy metals	Fröhlich S. Gombler W. Schlaak M. Siefert E. Nottelmann M. Vrielink A. Ziegler C.
143	Assessment of ecological risk at intensive phytoextraction of soils contaminated by heavy metals.	Galiulina R.R. Galiulin R.V.
1086	Use of the hyperaccumulator <i>Thlaspi caerulescens</i> for bioavailable contaminant stripping	Hamon R.E. McLaughlin M.J.
1032	The application of the phytoremediation process for dechroming chromium contaminated sediment	Lakatos G. Meszaros I. Papp L. Simon L. Kiss M. Veres Sz. Kiss K.M.
1003	Revegetation of Pb/Zn mine tailings (chat) in the tristate mining region, U.S.A.	Lambert M. Pierzynski G. Hetrick B. Erickson L. Sweeney D.
772	Remediation of the Jales mine spoil by inactivation and phytostabilisation: study in lysimeters	Mench M. De Koe T. Vangronsveld J. Bussiere S. Boisson J. Masson P.
1065	Rhizofiltration method for the cleaning of radioactive contaminated aquatic systems	Mikheev A. Sorochinsky B. Ruchko M. Prokhnevsky A.
471	Phytoavailability of Cadmium in leaf residues of the hyperaccumulator <i>Thlaspi caerulescens</i> incorporated into soil.	Perronnet K. Gérard E. Schwartz C. Morel J.-L.
790	Nickel Depletion by Hybrid Poplar: Assessing phytoremediation potential	Punshon T. Adriano D.C.
1178	A multidimensional method for evaluation phytoremediation of heavy metal polluted soil	Sacco P. Wenzel W.W. Mazzetto F.
469	Root architecture of a Zn-Hyperaccumulator plant as affected by metal content and localisation in soil	Schwartz C. Saison K. Perronnet K. Morel J.L.
136	Response of anti-oxidative enzymes to metal stress in non- and hyperaccumulator plants	Schickler H. Caspi H.
113	Relative efficiency of Brassica genotypes for phytoremediation of lead contaminated soils.	Singh K. Brar J.S.
1099	Quantitative evidence for active foraging for zinc by the roots of <i>Thlaspi caerulescens</i>	Whiting S.N. Leake J.R. McGrath S.P. Baker A.J.M.

### T14 – Polluted / Contaminated Environments Oral Presentations (Room II)

#	Title	Authors
<b>Part 1</b> <b>Chair: Pamela Russel</b> <b>July 15, 10:45-12:45</b>		
924	Arsenic and heavy metal contamination and uptake by rice crops around an abandoned Au-Ag mine in Korea	Ahn J.S. Chon H.-T. Kim K.-W.
115	Contamination of soils and plants by tellurium	Asami T. Tsuchihashi K. Kubota M.
700	Cadmium and zinc in pasture plants exposed to atmospheric deposition from distant sources	Brekken A. Steinnes E.



907	Zn, Pb and Cd transfer in polluted soils situated in the proximity of metallurgic plants	Denaix L. Semlali M.R. Huber K. Douay F. van Oort F.
57	Zn mobilisation in forest soil near the Harjavalta Cu-Ni smelter, SW Finland	Derome J. Nieminen T.
316	Accumulation of Cu and Ni in soil and vegetation near the Harjavalta Cu-Ni smelter, SW Finland	Helmisaari H.-S. Derome J. Nieminen T. Saarsalmi A. Salemaa M. Vanha-Majamaa I.
778	Contamination of heavy metals in soils and plants around the Dalsung Copper-Tungsten Mine, Korea	Jung M.C. Thornton I. Chon H.-T.
264	Reaction of the soil gas-phase to environmental pollutants	Lukacs A. Partay G. Bujtas K. Nemeth T.

### Poster Presentations

#	Title	Authors
<b>July 15, 14:00-15:30</b>		
1126	Characterization of heavy metals in soils from an iron and steel works in Naples, Italy	Adamo P. Terribile F. Violante P.
176	Heavy metal contamination in marigold, with special reference to chromium	Bini C. Gabbriellini R. Gonelli C. Maleci L. Paolillo A.
962	Petrometals and certain ecological problems	Davydova S.L.
918	Arsenic affected soils in the surroundings of a mine in Zactaecas, Mexico	Fernandez-Lomelin P. Envila-Navaro A.R. Gutierrez-Ruiz M.-E. Sommer-Cervantes I.
185	Trace elements in the soils near the centers of mining industry.	Goloubeva N.
397	Cadmium, lead and zinc content in soil and in some vegetables near the landfill of lead smelter Mezica after accidental fire.	Grčman H. Kugonic N. Zupan M. Hudnik V. Lobnik F.
903	The study of fluorine mobile form concentrations in soil contaminated with acidious fluorides	Grishko V.N. Zabolotny L.P.
987	Metal contamination of soils and crops from textile and dyeing factories in Narayanganj industrial areas	Islam M. Ullah S.M. Mollah D.H.
999	Heavy metals in soils and selected plant species in the area of historical copper mining and smelting centre in the landscape park "Chelmy", Poland	Karczewska A. Luszczynska M.
377	Pb distribution patterns in vegetative organs of plants in the agrosystems under different levels of pollution.	Komissatova I.F. Serdukova A.V. Dobrodeev O.P.
245	Heavy metal contamination of agricultural landscapes in the moscow region	Kosheleva N.E. Garanushkin M.N.
118	Zn-flow in soil-plant-animal system within a polluted area	Lacatusu R. Avram N. Kovacsovics B. Lungu M. Carstea S.
588	Contamination of soils, sediments, plants and waters by natural or mined ore deposits in Switzerland	Pfeifer H.-R.
672	Effect of some micropollutants on the soil	Szabo L.
1070	Heavy metals in a mine dump in Galicia, NW Spain	Vaamonde C. Lozano M.L. Alvarez E. Fernandez Marcos M.L.

## T15 - Remediation and Restoration of Polluted Environments

### Oral Presentations (Room II)

#	Title	Authors
<b>Part 1</b> <b>Chair: Anna Karczewska</b> <b>July 13, 8:15-10:15</b>		
943	Remediation of the Jales Mine Spoil, tolerance of <i>Holcus Lanatus</i> L. to Arsenat	Assuncao A.L. De Koe T. Bleeker P.M.
1025	Bunker Hill superfund site: Ecological restoration program	Brown S.L. Henry C.L. Devolder P. Compton H. Chaney R.
1109	Efficacy of lime and ferric hydroxide as ameliorants for Ni phytotoxicity - a pot study	Chaney R. L. Kukier U.
38	Remediation of metal polluted gardens by soil covering	Delschen T.
715	Desorption of heavy metals by surfactants and complexing agents in the contaminated soils	Doong R.-a. Wu Y.-w. Lin C.-f. Jiang H.-j.
81	Effect of zeolite and apatite on mobility and speciation of metals.	Knox A.S. Adriano D.C.
1037	Removal of heavy metals from soil in a closed-cycle-bioleaching process	Koeckritz, T. Zielinska, Z. Kayser, G. Markert, B.
128	Removal of Lead from soil by electrokinetic process.	Weng C.-H. Lin Y.-H. Hwang C.-C.
<b>Part 2</b> <b>Chair: Laszlo Simon</b> <b>July 13, 10:45-12:30</b>		
896	Immobilisation of heavy metals in contaminated soil: evaluating the use of synthetic zeolites	Oste L. Roskam G. Bucker D. Lexmond T.
20	Remediation of highly saline petroleum and heavy metal contaminated fine textured soils	Majid A. Khan A.K. Xu J.G. Sparks B.D.
9	Efficiency valuation of some methods for remediation of metal-contaminated soils.	Mule P. Melis P.
29	Electrodialytic remediation of different Cu-polluted soils	Ottosen L.M. Hansen H.K. Hansen L. Kliem B.K. Villumsen A.
1043	In-situ remediation of cadmium contaminated soils: a field investigation	Penny C. Lepp N.W.
905	Removal of Trace elements from waste water with biologically active moving-bed Sandfilters	Pümpel T. Ebner C. Pernfuss B. Schinner F. Diels L. Glombitzky F. Keszthelyi Z. Macaskie L. Tsezos M. Winters J. Wouters H.
282	Polyacrylate polymers remediate sandy soils contaminated with toxic metals.	Varennnes A.de Torres M.O.

### Poster Presentations

#	Title	Authors
<b>July 13, 14:00-15:30</b>		
824	Arsenate exchange between soil and solution in soils treated with steel shots and beringite	Boisson J. Morel C. Mench M.
706	Chemical remediation methods influence on the uptake of cadmium and lead by vegetables in contaminated soils	Chen Z.-S. Looi K.-S. Liu J.-C.
1105	Amendments to reduce trace elements mobility	Friesl, W. Lombi, E. Horak, O. Wenzel, W.W.
1082	Lead immobilization in lead contaminated soils	Geebelen W. Vangronsveld J. Clijsters H.
399	Remediation of an acid soil using hydroxyapatite and zeololthes	Ghuman G.S. Sajwan K.S. Alva A.K.

121	West page swamp wetland restoration project at Bunker Hill, ID.	Henry C.L. Brown S.L. Compton H.
853	Can FBC ash be useful for metal inactivation in contaminated materials and for revegetation?	Mench M. Lecuyer I. Kopponen P. Girardi S. Ruttens A.
1112	Electrokinetic remediation of metal contaminated soils: preliminary studies using arsenic contaminated soil	Naidu R. Smith E.
1115	Soil washing techniques for removal of arsenic contaminated soils	Naidu R. Smith J. Swift R.S.
806	Performance of an extraction procedure for heavy metal removal from a contaminated silty clay soil	Tack F. Masscheleyn P.H. Verloo M.G.

## T16 - Retention and Adsorption of Trace Elements Poster Presentations

#	Title	Authors
<b>July 15, 14:00-15:30</b>		
702	Zinc adsorption by acric soils of the state of Sao Paulo, Brazil	Casagrande J.C. Alleoni L.R.F. Camargo O.A. de Silva M.F.
680	Copper adsorption and pH effects in highly weathered Brazilian Oxisols	Alleoni L.R.F. Casagrande J.C. Camargo O.A. Silveira M.L.A.
840	Zinc sorption as influenced by its rates and plant residues in an incubation experiment I: Adsorption coefficients	Diatta J. Grzebisz W.
841	Zinc sorption as influenced by its rates and plant residues in an incubation experiment II: Langmuir one-surface adsorption parameters	Diatta J. Grzebisz W.
1102	Sorption of lead and cadmium on dolomites from Ileszczawka deposit	Gasior J. Kielb J.
192	Kinetic and equilibrium study of Zn sorption by grey forest soils of Russia.	Karavanova E. Kudelina E.
384	Enhancement of Cu adsorption on soils in presence of amitrole	Maqueda C. Morillo E. Carrillo M. Marín M.
774	Copper and zinc competitive adsorption in schistic and granitic acid soils	Mesquita M.E.
1054	Metal attenuation by precipitates formed from acid sulfate waters	Monterroso C. Macias F.
794	Long-term reduction of trace element sorption capacity in a soil-aquifer treatment (SAT) system	Roehl K.E. Banin A.
1169	The effect of solution composition on the sorption kinetics of As(V) in soil	Smith E. Naidu R. Alston A.A.
938	Adsorption of ferrioxamine_B (FeDFOB) onto monosaturated Me-n+ bentonite	Solinas V. Deiana S. Manunza B. Gessa C.
954	Chromate removal by dithionite-reduced clays	Taylor R.W. Shen S. Bleam W.F. Tu S.-I. Sajwan K.S. Sistani K.R.

**T17 - Long-Term Trends of Trace Element Deposition and Accumulation**  
**Oral Presentations (Room IV)**

#	Title	Authors
<b>Part 1</b> <b>Chair: Balram Singh</b> <b>July 13, 16:00-18:00</b>		
695	Holocene concentration changes of mercury in two ombrotrophic bogs in Southern Sweden	Bindler R. Renberg I. Munthe J.
831	Atmospheric lead pollution trends in Sweden during 4000 years	Brännvall M.L. Bindler R. Renberg I. Emteryd O.
77	Determining the history of metal deposition in a subtropical ecosystem	Holmes C. Robbins J.A.
770	Separating natural and anthropogenic fractions of Hg using thermal lability analysis of a peat core	Martinez Cortizas A. Pontevedra Pombal X. Garcia-Rodeja E. Shotyk W.
957	Changes and distribution of extractable Cu and Zn in a Spodosol profile under a long-term differentially limed and fertilized sward	Monteiro F.A. Blue W.G.
833	Cumulative loads of anthropogenic lead and its fate in boreal forest soils, Sweden	Renberg I. Brännvall M.-L. Bindler R. Emteryd O.
48	Historical monitoring of environmental pollution using pollution time capsules.	Satake K. Idegawa R. Ohata M. Furuta N.
798	Independent records of long term atmospheric Pb deposition to swiss forest soils using peat cores from ombrotrophic bogs	Shotyk W. Blaser P.

**T18 - Speciation**  
**Oral Presentations (Room III)**

#	Title	Authors
<b>Part 1</b> <b>Chair: Rene Prost</b> <b>July 15, 08:15-10:15</b>		
127	Characterization of arsenic in soil from the Löcknitz site using synchrotron x-ray absorption spectroscopy	Sayers D. Hesterberg D. Zhou W.
219	Mercury speciation in tailings and river sediments o the Idrija Mercury Mine Area	Biestler H. Gosar M.
713	Speciation and mobility of trace metals in polluted soils and sediments from road environment	Delmas C. Remy N. Pagotto C. Legret M.
1147	Correlating manganese X-ray absorption near-edge structure spectra with extractable soil manganese	Guest C. Schulze Thompson Scheinost A. Huber
742	Speciation of heavy metals in landfill-leachate polluted groundwater	Jensen D.L. Ledin A. Christensen T.H.
1122	Zinc speciation in a smelter-impacted soil by a combination of EXAFS data and chemical extraction	Juillot F. Morin G. Ildefonse P. Dumat C. Benedetti M. Chevallier P. Brown Jr. G.E. Calas G.
1001	Metal speciation in environmental samples using on line-hyphenation of capillary electrophoresis resp. HPLC to ICP/MS	Kettrup A.A.
138	Arsenic oxidation states in chemically extracted soils	Doner H.E. Sun X.

<b>Part 2</b>		<b>Chair: Samuel Traina</b>	<b>July 15, 10:45-12:15</b>
1123	Chemical forms of lead in a soil developed on a Pb-mineralized sandstone (Ardèche, France)	Morin F. Juillot F. Ildefonse P. Dumat C. Benedetti M. Chevallier P. Brown Jr. G.E. Calas G.	
919	Studying of fate of chromium(VI) in soils by speciation	Prokisch J. Kovacs B. Gyori Z.	
1133	Speciation and complexation of cadmium in soil solutions	Sauvé S.	
96	Radio-labile cadmium and zinc in contaminated soils	Tye A.M. Young S.D. Crout N. Carstensen A. Resende L.	
819	Determination of dissolved inorganic selenium speciation in waters by ion chromatography – hybri generation – atomic fluorescence spectrometry (IC-HG-AFS)	Wallschläger D. Bloom N.S.	

### Poster Presentations

#	Title	Authors
<b>July 15, 14:00-15:30</b>		
959	Comparative study of speciation of trace elements on polluted and non polluted soils	Bech J. Lansac A. Rustullet J. Catalan M.
1018	Metal sulfide speciation in a sediment from the influence of pH and oxidation kinetics on solubility	Cauwenberg P. Maes A.
1069	Fluoride and aluminium speciation in the soil liquid phase in the vicinity of an aluminium smelter in NW Spain	Gago C. Fernandez Marcos M.L. Alvarez E.
419	Speciation and movement of selected heavy metals in long-term poultry waste-amended soils	Han F.X. Kingery W.L.
389	The oxidative behavior of Mn oxides in high-Mn soils	Ross D.S. Hales H.C. Shea-McCarthy G.C.
1175	Assessment for clean-up processes of polluted soil by sequential extraction and XAFS	Stichenothe H. Thoeming J. Mangold S. Welter E. Calmano W.

### T19 – Toxicity Oral Presentations (Room II)

#	Title	Authors
<b>Part 1</b>		
<b>Chair: Kenneth Sajwan</b>		
<b>July 12, 14:00-15:30</b>		
574	Evaluation of cation toxicities to sunflower; a study related to the assessment of elemental environmental hazards	Enache M. Palit P. Dearden J.C. Lepp N.W.
11	Correlation of free metal ion activities with toxicity response	Hall J. Cresser M. Cotter-Howells J.
259	Phytotoxicity of some micropollutants on calcareous chernozem soil	Kadar Imre
911	Ecotoxicology of copper: a case study of the impact of particulate copper emission from a copper rod-rolling plant on the bryophyte flora of surrounding grassland	Lepp, N.W. Salmon, D.
762	Morphological and biochemical changes of Zinnia elegans under cadmium stress	Liu T.W. Wang S.Y. Chen C.C. Chen Y.R.
1010	Reevaluating the free-ion activity model of trace metal toxicity: Experimental evidence with copper	Parker D.R. Pedler J.F.

<b>Part 2</b>		<b>Chair: Katta Reddy</b>	<b>July 12, 16:15-17:45</b>
992	Mercury pollution in Eastern India - genotoxic effects in plant systems	Patra M. Sharma A.	
354	Root stunting caused by zinc toxicity is ameliorated by micromolar levels of magnesium and potassium	Pedler J. Parker D.R.	
886	Phytochelatin constitutive amino acids and histidine abrogate copper toxicity in <i>Ceratophyllum demersum</i> L. - aquatic macrophyte	Rama Devi S. Prasad M.N.V.	
1006	Possible relationships between soil factors and oesophageal cancer in less developed areas	Laker M.C.	
1009	Association between chronic arsenic exposure and children's intelligence in Thailand	Unchalee S.	
80	Effect of Lanthanum on seedling stage of wheat	Zhu J.G. Sun X.M. Xie Z.B.	

### Poster Presentations

#	Title	Authors
<b>July 13, 14:00-15:30</b>		
1020	Effect of inorganic lead on growth and development of <i>Hordeum vulgare</i> L.	Bhowmik N. Sharma A.
697	Effects of Cr-VI sorption on two species of <i>Calendula</i> ( <i>C. arvensis</i> L. and <i>C. officinalis</i> L.)	Bini C. Ieri E. Gonelli C. Paolillo A.
1171	Zinc tolerance in metalliferous and non-metalliferous populations of <i>Cardaminopsis halleri</i>	Bert V. MacNair M.R. Saumitou-Laprade P. Petit D.
944	The isolation of a tonoplast protein possibly related to naturally selected zinc tolerance in <i>Silene vulgaris</i> using 2-D gelelectrophoresis	Chardonnnes A.N. Hakvoort H.W.J. Koevoetsand P.L.M. Verkleij J.A.C.
719	Responses to copper toxicity during in vitro initiation in <i>Helianthus annuus</i> "Sunspot" (sunflower)	Enache M. Palit P. Dearden J.C. Lepp N.W.
1081	Some physiological aspects of Pb phytotoxicity	Geebelen W. Vangronsveld J. Clijsters H.
729	Copper tolerance testing on plant species growing near a copper smelter in central Chile	Ginocchio R.
1034	Induction of plant pathogenesis-related proteins by heavy metals	Krämer U. Goldack D. Kiriazidou G. Dietz K.-J.
213	Copper induced Amino Acid Synthesis in the xylem sap of chicory and tomato plants	Liao M.T. Hedley M.J. Woolley D.J. Brooks R.R. Nichols M.A.
123	Trace element influence on chronic bronchitis development.	Lykholat H.
771	Growth, mineral composition, and biomarkers in maize exposed to metal contaminated soils	Mench M. van Oort F. Girardi S. Audie-Liebert G.
181	Aminoacids and antioxidants ameliorate copper toxicity in <i>Scenedesmus Bijugatus</i>	Nagalakshmi N. Prasad M.N.V.
1031	Phytochelatin induction in periphytic green algae of the genus <i>Stigeoclonium</i> by heavy metals contained in mining water	Pawlik-Skowronska B. Pirszel J. Skowronski T.
885	Non-ferrous metal binding properties of ferritin in <i>Vigna mungo</i> (L.) Hepper (black gram): role in heavy metal detoxification	Rama Kumar T. Prasad M.N.V.
964	Metallothionein gene of <i>Silene vulgaris</i> increases tolerance of heavy metal sensitive yeasts	Tervahauta A.I. Hassinen V. van Hoof N. Schat H. Verkleij J.A.C. Kärenlampi S.O.

## Post-Conference Tours

Various post conference tours are offered in Austria, to Czech Republic, Hungary, and Slovenia. Field sites on trace element research will be visited and research results presented. Laboratories involved in trace element research will be visited and the opportunity will be given to participants to discuss with scientists working in the host country of the respective tour. Prices (see 3<sup>rd</sup> announcement) include transportation (air-conditioned bus), food and accommodation during the tour. Please make sure to book your hotel for the night of your return to Vienna (not included in the price).

### **Austria (1 day: July 16, 1999)**

1 day: *Vienna - Günser Mountains - National Park Lange Lacke - Vienna*

*Günser Mountains:* Metal flux measurements, soils with metal accumulation at depth, metal hyperaccumulating plants in their indigenous environment. *National Park Lange Lacke:* Salt affected soils, Visiting the National Park and wine tasting at a local winery.

### **Czech Republic (3 days: July 16 – 18, 1999)**

1. day: *Vienna - Cesky Krumlov - Prague*

*Cesky Krumlov* - beautiful historical town and majestic castle. *Trebon*, Institute of Microbiology of the Czech Academy of Sciences - The effect of heavy metals on the growth of algae and their activities. Arrival to *Prague*

2. day: *Prague - North Bohemia - Prague*

Trip from *Prague* to *North Bohemia*. Institute of Crop Production Experimental Station in *Chomutov* - Accumulation of heavy metals by crops; emission effect on forest growth; disturbance of land by coal industry; land reclamation. Return to *Prague* and sight-seeing tour. Czech evening in a traditional Czech pub with a national dinner and typical Czech music.

3. day: *Prague - Vienna*

Visit of the Czech University of Agriculture - Field experiments with sewage sludge application. Walking tours in *Prague* - Castle, Charles Bridge, Old Town Square. Departure to *Vienna*.

### **Hungary (3 days: July 16 – 18, 1999)**

1. day: *Vienna - Sopron - Little Balaton - Keszthely*

Plant Health and Soil Conservation Station of Vas county at *Tanakajd* - soils tests, expert advisory system *Little Balaton* - Water Quality of lake Balaton. Accommodation in *Keszthely*

2. day: *Keszthely - Badacsony - Tihany - Peremarton - Nagyhörcsök - Velence*

Touristic sight-seeing tour; *Peremarton* Fertilizer Factory - aspects of environmental protection. Experimental Station of the RISSAC research institute at *Nagyhörcsök* - heavy metal application in long-term field trials. Accommodation in *Velence*.

3. day: *Velence - Budapest - Vienna*

*Velence* - Remediation area. *Budapest* - short sight-seeing tour. Return to *Vienna*.

### **Slovenia (3 days: July 16 – 18, 1999)**

1. day: *Vienna - Celje*

Center for Soil and Environmental Sciences - heavy metal contaminated monitoring sites. Historical sight-seeing tour. *Dobrna* resort - GIS presentation and discussion; dinner, thermal bath. Accommodation in *Dobrna*.

2. day: *Dobrna resort - Velenje - Mepesetaica - Dobrna resort*

*Velenje* - fly ash deposition and its recultivation. *Mepesetaica* - Visit of a recently closed lead and zinc mining site - Environmental and social consequences of centuries of lead mining and smelter activities. *Dobrna* resort - dinner and Slovenian wine tasting. Accommodation in *Dobrna* resort.

3. day: *Dobrna resort - Ljubljana - Bled - Vienna*

*Ljubljana* - sight-seeing tour. *Bled* - beautiful historical town - farewell lunch. Return to *Vienna*.